Wiring Diagrams

NOTE: This literature applies to units produced after 11/3/96 (software version 2.0 or greater)

DIAGRAM INDEX

UNIT LABEL DIAGRAM

Unit	Voltage	Label Diagram Type	Serial Number Effective	Label Diagram	Figure No.
48EJ,EW024-034	ALL	Component Arrangement	3497F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501531	2
		24-V Control Circuit	3497F	48EJ500387	3
	208/230-3-60	Power Schematic	2996F	48EJ500727	4
	460-3-60	Power Schematic	2996F	48EJ500727	4
	575-3-60	Power Schematic	2996F	48EJ500907	5
48EK,EY024-034	ALL	Component Arrangement	3497F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501532	6
		24-V Control Circuit	2698F	48EJ500729	7
	208/230-3-60	Power Schematic	2996F	48EJ500727	4
	460-3-60	Power Schematic	2996F	48EJ500727	4
	575-3-60	Power Schematic	2996F	48EJ500907	5
50EJ,EW024-034	ALL	Component Arrangement	3497F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501531	2
		24-V Control Circuit	1897F	48EJ500900	8
	208/230-3-60	Power Schematic	2996F	48EJ500727	4
	460-3-60	Power Schematic	2996F	48EJ500727	4
	575-3-60	Power Schematic	2996F	48EJ500907	5
	380-3-60	Power Schematic	2996F	48EJ500908	9
	400-3-50	Power Schematic	2996F	48EJ500908	9
50EK,EY024-034	ALL	Component Arrangement	3497F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501532	6
		24-V Control Circuit	2698F	48EJ500901	10
	208/230-3-60	Power Schematic	2996F	48EJ500727	4
	460-3-60	Power Schematic	2996F	48EJ500727	4
	575-3-60	Power Schematic	2996F	48EJ500907	5
	380-3-60	Power Schematic	2996F	48EJ500908	9
	400-3-50	Power Schematic	2996F	48EJ500908	9
48EJ,EW038-048	ALL	Component Arrangement	1198F	48EJ501527	11
		120-V Control Circuit	1597F	48EJ501531	2
		24-V Control Circuit	3497F	48EJ500387	3
	208/230-3-60	Power Schematic	1597F	48EJ501533	12
	460-3-60	Power Schematic	1597F	48EJ501533	12
	575-3-60	Power Schematic	2996F	48EJ500909	13
48EJ,EY038-048	ALL	Component Arrangement	1198F	48EJ501527	11
		120-V Control Circuit	1597F	48EJ501532	6
		24-V Control Circuit	2698F	48EJ500729	7
	208/230-3-60	Power Schematic	1597F	48EJ501533	12
	460-3-60	Power Schematic	1597F	48EJ501533	12
	575-3-60	Power Schematic	2996F	48EJ500909	13

DIAGRAM INDEX (cont)

UNIT LABEL DIAGRAM

Unit	Voltage	Label Diagram Type	Serial Number Effective	Label Diagram	Figure No.
50EJ,EW038-048	ALL	Component Arrangement	1198F	48EJ501527	11
		120-V Control Circuit	1597F	48EJ501531	2
		24-V Control Circuit	1897F	48EJ500900	8
	208/230-3-60	Power Schematic	1597F	48EJ501533	12
	460-3-60	Power Schematic	1597F	48EJ501533	12
	575-3-60	Power Schematic	2996F	48EJ500909	13
	380-3-60	Power Schematic	2996F	48EJ600910	14
	400-3-50	Power Schematic	2996F	48EJ500910	14
50EJ,EY038-048	ALL	Component Arrangement	1198F	48EJ501527	11
		120-V Control Circuit	1597F	48EJ501532	6
		24-V Control Circuit	2698F	48EJ500901	10
	20/230-3-60	Power Schematic	1597F	48EJ501533	12
	460-3-60	Power Schematic	1597F	48EJ501533	12
	575-3-60	Power Schematic	2996F	48EJ500909	13
	380-3-60	Power Schematic	2996F	48EJ500910	14
	400-3-50	Power Schematic	2996F	48EJ500910	14
48EJ,EW054-068	ALL	Component Arrangement	0898F	48EJ501662	15
		120-V Control Circuit	4297F	48EJ501669	16
		24-V Control Circuit	0898F	48EJ501661	17
	208/230-3-60	Power Schematic	4297F	48EJ501659	18
	460-3-60	Power Schematic	4297F	48EJ500076	19
	575-3-60	Power Schematic	4297F	48EJ501663	20
48EK,EY054-068	ALL	Component Arrangement	0898F	48EJ501662	15
		120-V Control Circuit	4297F	48EJ501664	21
		24-V Control Circuit	2698F	48EJ501665	22
	208/230-3-60	Power Schematic	4297F	48EJ501659	18
	460-3-60	Power Schematic	4297F	48EJ500076	19
	575-3-60	Power Schematic	4297F	48EJ501663	20
50EJ,EW054-068	ALL	Component Arrangement	0898F	48EJ501662	15
		120-V Control Circuit	4297F	48EJ501669	21
		24-V Control Circuit	0898F	48EJ501666	23
	208/230-3-60	Power Schematic	4297F	48EJ501659	18
	460-3-60	Power Schematic	4297F	48EJ500076	19
	575-3-60	Power Schematic	4297F	48EJ501663	20
	380-3-60	Power Schematic	4297F	48EJ501667	24
	400-3-50	Power Schematic	4297F	48EJ501667	24
50EK,EY054-068	ALL	Component Arrangement	0898F	48EJ501662	15
		120-V Control Circuit	4297F	48EJ501664	21
		24-V Control Circuit	2698F	48EJ501668	25
	208/230-3-60	Power Schematic	4297F	48EJ501659	18
	460-3-60	Power Schematic	4297F	48EJ500076	19
	575-3-60	Power Schematic	4297F	48EJ501663	20
	380-3-60	Power Schematic	4297F	48EJ501667	24
	400-3-50	Power Schematic	4297F	48EJ501667	24
50EJQ,EWQ024,028	ALL	Component Arrangement	4297F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501531	2
		24-V Control Circuit	2997F	48EJ501040	26
	208/230-3-60	Power Schematic	2996F	48EJ500727	4
	460-3-60	Power Schematic	2996F	48EJ500727	4

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ACCESSORIES	
Item	**Figure No.**
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Electric Heat	32
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*For 024-048 units power exhaust is shown in the unit wiring diagrams. Refer to the power and control wiring diagrams for wiring information. For 054-068 units, the power exhaust is shown in Fig. 27 and 28.

48/50EJ,EK,EW,EY UNITS

NOTE: Unit is shipped with default values that can be changed through CCN software or using an accessory LID-2B.

Cooling, Constant Volume (CV) Units — On power up, the control module will activate the initialization software. The initialization software reads each DIP switch to determine the unit configuration. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for CV operation; sets maximum heat stages to 2; and sets maximum cool stages to 3. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation.

The TSTAT function performs a thermostat based control by monitoring Y1, Y2, W1, W2, and G inputs. These functions control stages: cool1, cool2, heat1, heat2, and the indoor fan, respectively. If the TSTAT function is not selected, the control module determines the occupancy state based on the system time schedules with a field-supplied sensor installed, or with remote occupied/unoccupied input. If Temperature Compensated Start is active, the unit will be controlled as in the Occupied mode.

Occupied or unoccupied comfort set points must be selected. The control module will set appropriate operating mode and fan control. The control module will turn on indoor fan if in Occupied mode or if the unit is in Unoccupied mode and the space temperature is outside of the unoccupied comfort set points (Unoccupied Heat or Unoccupied Cool). The control module will then monitor space temperature against comfort set points and control heating or cooling stages as required. If the system is in the Occupied mode, the economizer will operate as required. If the system is in Unoccupied mode, the system will perform nighttime free cool and IAQ (indoor air quality) pre-occupancy purge as required (when functions are enabled via software). Whenever the DX (direct expansion) cooling is requested, the outdoor fan will operate.

The control module will operate economizer, run diagnostics to monitor alarms/alerts at all times, and respond to CCN communications to perform any configured network POC (product outboard control) functions such as time/outdoor-air temperature broadcast and global occupancy broadcast. When the optional expansion I/O board is employed, it will: perform a periodic scan and maintain a database of expanded I/O points; perform Fire/Smoke control (power exhaust required); if in Occupied mode, perform IAQ control and monitor the fan, filter, demand limit, and field-applied status (with accessories).

If thermostats are used to energize the G input, the control module will turn on the indoor fan without delay and open the economizer dampers to minimum position. If thermostats are used to deenergize the G input, the control module will turn off the indoor fan without delay and close the economizer dampers.

When cooling, G must be energized before cooling can operate. The control module determines if outdoor conditions are suitable for economizer cooling using the standard outdoor air thermistor. For the economizer to function for outside air cooling: the enthalpy must be below the enthalpy set point; the outdoor-air temperature must be equal to or less than the High Outdoor Air Temperature Lockout (default is 65 F); the SAT (supply-air temperature) thermistor must not be in alarm; and the outdoor air reading is available. When these conditions are satisfied, the control module will use economizer as the first stage of cooling.

When Y1 input is energized, the economizer will be modulated to maintain SAT at the defined set point. (The default is 55 F.) When SAT is above the set point, the economizer will be 100% open. When SAT is below the set point, the economizer will modulate between minimum and 100% open position. When Y2 is energized, the control module will turn on compressor no. 1 and continue to modulate the economizer as described above. If the Y2 remains energized and the SAT reading remains above the set point for 15 minutes, compressor no. 2 will turn on. If Y2 is deenergized at any time, only the last stage of compression that was energized will be turned off. If outdoor conditions are not suitable for economizer cooling, the economizer will go to minimum position and cycle compressors no. 1 and 2 based on demand from Y1 and Y2 respectively. The compressors will be locked out when the SAT temperature is too low (less than 40 F for compressor no. 1 and less than 45 F for compressor no. 2). After a compressor is locked out, it can restart after normal Time Guard® period.

The Time Guard function maintains a minimum off time of 5 minutes, a minimum on time of 10 seconds, and a minimum delay before starting the second compressor of 10 seconds.

When heating, the heat stages respond to the demand from W1 and W2 of the thermostat input. Heating and cooling will be mutually locked out on demand on a first call basis. The heating and the cooling functions cannot operate simultaneously.

Cooling, Variable Air Volume (VAV) Units — On power up, the control module will activate the initialization software. The initialization software reads each DIP switch to determine the unit configuration. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for VAV operation; sets maximum heat stages to 1; and sets maximum cool stages to 6. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation. Power up takes a random time of 1 to 63 seconds plus 5 minutes the first time power is sent to the control board after a power outage.

The control module will determine if an interface (linkage) is active and if the unit will operate in a Digital Air Volume (DAV) mode. In a DAV system, the room terminals are equipped with microprocessor controls that give commands to the base unit module. If a linkage is active, the control module will replace local comfort set points, space and return air temperatures, and occupancy status with the linkage data supplied.

The control module will determine occupancy status from Time Schedules (if programmed), Remote Occupied/Unoccupied input, global occupancy schedules, or DAV. If temperature compensated start is active, the unit will be controlled as in the Occupied mode.

Temperature compensated start is a period of time calculated to bring the unit on while in Unoccupied mode to reach the occupied set point when occupancy occurs.

The control module will set the appropriate operating mode and fan control. The control module will turn on the variable frequency drive (VFD) if Occupied mode is evident. If in Unoccupied mode and a valid return-air temperature reading is available (either from a sensor or DAV), the control module will monitor return-air temperature against unoccupied heat and cool set points. The control module will start the VFD whenever return-air temperature is outside of the set points (Unoccupied Heat or Unoccupied Cool). The VFD may also be started by nighttime thermostat via remote Occupied/Unoccupied input or by a temperature compensated start algorithm. When the VFD is running in a normal mode, the control module will start heating or cooling as required to maintain supply-air temperature at the supply air set point plus the reset (when enabled). The reset value is determined by SAT (supply-air temperature) reset and/or space temperature reset algorithms. The space temperature reset (requiring a space temperature sensor) is only available when enabled through software.

When cooling, the control module will energize the power exhaust enable output to the external power exhaust controller (when power exhaust is used).

The control module will run continuous diagnostics for alarms/alerts; respond to CCN (Carrier Comfort Network) communications; perform any configured network POC (Product Outboard Control) functions such as time/outdoor air temperature broadcast and global broadcast; and perform Fire/Smoke control.

Heating, Constant Volume (CV) Units

48 SERIES UNITS — The gas heat units incorporate 2 separate systems to provide gas heat. Each system incorporates its own induced-draft motor, Integrated Gas Control (IGC) board, 2 stage gas valve, manifold, etc. The systems are operated in parallel; for example, when there is a call for first stage heat, both induced-draft motors operate, both gas valves are energized, and both IGC boards initiate spark.

All of the gas heating control is performed through the IGC boards (located in the heating section). The base module board serves only to initiate and terminate heating operation.

The base module board is powered by 24 vac. When the thermostat or room sensor calls for heating, power is sent from the base module board to W on each of the IGC boards. An LED on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized, and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat set for fan auto., 45 seconds after ignition occurs, the indoor-fan motor will be energized and the outdoor-air dampers will open to their minimum position. If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and the outdoor-air dampers will be in the minimum position.

If the unit is controlled with a room sensor in the Unoccupied mode, the indoor fan will be energized through the IGC board with a 45-second delay and the outside-air dampers will move to the IAQ (indoor air quality) position (generally closed in the Unoccupied mode). If IAQ is not enabled, dampers will move to the minimum position.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valves. When the thermostat is satisfied, W1 and W2 open and the gas valves close interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto., the indoor-fan motor will continue to operate for an additional 45 seconds then stop and the outdoor-air dampers will close. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

50 SERIES UNITS — The control module is powered by 24 vac. If the unit is controlled with a room sensor, the fan will run continuously in the Occupied mode, with the outside-air damper in the minimum position. If the unit is controlled through a room thermostat (with FAN set to AUTO), upon a call for heat the first stage of heat is energized, the indoor-fan motor will turn on, and the outdoor-air damper will move to the minimum position. Upon a call for additional heat (if the unit is equipped with a two-stage heater), the second stage of heat is energized. When the call for heat is satisfied, the heaters will deenergize. The indoor-fan motor will also deenergize (unless controlled by a room sensor) and the outdoor-air damper will move to the closed position.

If the unit is controlled with a room sensor the fan will not run in the Unoccupied mode. Upon a call for heat, the first stage of heat is energized, the indoor-fan motor will turn on, and the outdoor air damper will move to the Unoccupied IAQ (indoor air quality) position (generally set to zero in the Unoccupied mode). The IAQ feature is enabled through system software. Upon a call for additional heat (if the unit is equipped with a two-stage heater), the second stage of heat is energized. When the call for heat is satisfied, the heaters and indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

Heating, Variable Air Volume (VAV) Units

48 SERIES UNITS — All of the gas heating control is performed through the integrated gas control (IGC) board. The base module board serves only to initiate and terminate heating operation.

NOTE: The unit is factory-configured for disabled occupied heating. Dual In-line Package (DIP) switch 5 is used to enable occupied heating (DIP switch 5 set to OPEN).

Variable Air Volume (VAV) occupied heat is controlled by return-air temperature (RAT) using a 5k thermistor located just below the outdoor air dampers. A VAV unit without a space temperature sensor is also controlled by RAT. A VAV unit with a space temperature sensor has unoccupied heat controlled by space temperature (SPT).

The base module board is powered by 24 vac. When there is a call for heating (either Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the base module board to W on each of the IGC boards and W2 of the main gas valve. A field-supplied heat interlock relay signals for the air terminals to open fully. The heat interlock relay is not required on DAV systems. In the Occupied mode the indoor-fan motor will be operating and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode the indoor-fan motor will be off, but will energize 45 seconds after the call for heat and the outdoor-air dampers will move to the IAQ (indoor air quality) Unoccupied position (generally set to closed in the Unoccupied mode). The duct pressure sensor will signal to the variable frequency drive to operate at full speed since all terminals have been driven open. An LED on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, and the flame sensor.

If the call for heat lasted less than 1 minute, the heating cycle will not terminate until 1 minute after heat became active. When heating is satisfied, the power will be interrupted to the IGC board and W1 and W2 of the main gas valve. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

50 SERIES UNITS — The control board is powered by 24 vac. When there is a call for heating (from Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the control module to energize the first stage of electric heat. A field-supplied heat interlock relay signals for the air terminals to fully open. In the Occupied mode, the indoor-fan motor will operate continuously and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode, the indoor-fan motor will be off, but will energize upon the call for heat. The outdoor-air dampers will move to the IAQ (indoor air quality) unoccupied position (generally set to zero in the Unoccupied mode). The duct pressure sensor will signal to the variable frequency drive to operate at full speed. When the call for heat is satisfied, the heaters will deenergize.

NOTE: The HIR is not needed in a DAV system.

If the unit is in the Unoccupied mode, the indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

Morning Warm-Up (VAV Only with PC Accessed/ CCN Operation) — Morning warm-up occurs when the control module has been programmed to turn on heat, prior to the Occupied mode, to be ready for the occupancy. Morning warm-up is a condition in VAV systems that occurs when the Temperature Compensated Start algorithm calculates a biased occupied start time and the unit has a demand for heating. The warm-up will continue into the occupied period as long as there is a need for heat. During warm-up, the unit can continue heating into the occupied period, even if occupied heating is disabled. When the heating demand is satisfied, the warm-up condition will terminate. To increase or decrease the heating demand, use the network access software to change the occupied heating set point.

NOTE: To utilize morning warm-up mode, the unit occupancy schedule must be accessed via Service Tool, ComfortWorks™, or Building Supervisor software or an accessory LID-2B.

For current software (version 3.0 or later), the Low Temperature Minimum Damper Position Override (LOWMDP) has a 0 to 100% limit, with a default of 100%. Think of the LOWMDP as a second minimum damper position. This LOWMDP limit change requires access to the unit software with a computer equipped with Building Supervisor, Service Tool, or ComfortWorks™ Software.

When the LOWMDP is in effect the outdoor dampers will remain at the LOWMDP position (typically set to 0% closed) during heating, even in the Occupied period. For the LOWMDP to be in effect the LOWMDP must be less than the minimum damper position (MDP). For VAV applications the RAT (return-air temperature) must be less than the OHSP (occupied heat set point) minus 2° F. Table 1 summarizes the operational requirements and controlling factors for occupied heat and morning warm-up.

Table 1 — Occupied Heat and Morning Warm-Up Operation Requirements and Controlling Factors

SOFTWARE VERSION	OCCUPIED HEAT ENABLED VIA	MORNING WARM-UP MAY START DURING	TEMPERATURE CONDITION FOR HEAT TO START
3.0 and 3.1	DIP Switch no. 5	Smart start or within 10 minutes	RAT < OHSP

LEGEND

OHSP — Occupied Heat Set Point
RAT — Return-Air Temperature

Morning Warm-Up (VAV Only with Stand-Alone Operation) — When a unit operates in stand-alone mode, morning warm-up occurs when the unit is energized in Occupied mode and return-air temperature (RAT) is below 68 F. Warm-up will not terminate until the RAT reaches 68 F. The heat interlock relay output is energized during morning warm-up. (A field-installed 24-vac heat interlock relay is required.) The output will be energized until the morning warm-up cycle is complete.

Space Temperature Reset Sensor (VAV Only)

— An accessory space temperature sensor (T-55 or T-56 without offset) is required. Space temperature reset is used to reset the supply-air temperature set point of a VAV system higher, as the space temperature falls below the Occupied Cool set point. As the space temperature falls below the cool set point, the supply-air temperature will be reset upward as a function of the reset ratio. Reset ratio is expressed in degrees change in supply-air temperature per degree of space temperature change. A reset limit will exist which will limit the maximum number of degrees the supply-air temperature may be raised. Both the reset ratio and the reset limit are user definable. The sequence of operation is as follows:

1. The on/off status of the unit supply fan is determined.
2. If the fan is on, the sequence will check if the system is in Occupied mode.
3. If the system is in Occupied mode, the sequence will determine if the reset option is enabled.
4. If the reset option is enabled, the sequence will read the space temperature and compare it to the Occupied Cool set point. If the temperature is below the Occupied Cool set point, the algorithm will compute the reset value and compare this value against the reset limit. If it is greater than the reset limit, the sequence will use the reset limit as the reset value.

NOTE: A computer equipped with Carrier network access software (ComfortWorks™, Building Supervisor, or Service Tool) or an accessory LID-2B is required to enable this function.

Supply-Air Temperature Reset (VAV Only) — A field-supplied 4 to 20 mA input signal enables the supply-air temperature to be reset 0° to 20° F (0° or 11.2° C). The supply-air temperature reset option does not need to be enabled.

VFD Control Via Field-Supplied 4 to 20 mA (Third Party Transducer) — To set the VFD for field-supplied 4 to 20 mA, the VFD must be powered up; however, since it is located near the indoor air fan, operation of the fan is not desirable. To disable the fan perform the following procedure:

1. Open the indoor fan circuit breaker.
2. Remove the jumper between CC and ST on the terminal strip of the VFD (see Fig. 50).
3. Move the jumper between CC and SS1 to CC and SS2 (JOG) on the terminal strip of the VFD.
4. Close the indoor fan circuit breaker. The VFD is powered, but the fan will not operate.
5. On the front of the VFD is a keypad and display which will be used to turn off the PID. To access this field, press the PRG key until the display reads J.PrG (Jump Frequency Group Parameters). Press the ARROW key until Fb.PI (Item 7, PID Set Point Control Select) is displayed. Use the UP or DOWN arrow key to adjust the setting to 0. The default value is 0. See Table 2.
6. Open the indoor fan circuit breaker.
7. Replace the jumper between CC and ST on the terminal strip of the VFD.
8. Close the indoor fan circuit breaker. The VFD is now powered and the fan will operate.

Table 2 — VFD Supply-Air Pressure Set Point

PRESSURE		CONTROL (mA)	VFD SET POINT
in. wg	kPa		
0.00	**0.000**	4.0	0
0.25	**0.062**	4.8	3
0.50	**0.124**	5.6	6
0.75	**0.187**	6.4	9
1.00	**0.249**	7.2	12
1.25	**0.311**	8.0	15
1.50	**0.373**	8.8	18
1.75	**0.435**	9.6	21
2.00	**0.498**	10.4	24
2.25	**0.560**	11.2	27
2.50	**0.622**	12.0	30
2.75	**0.684**	12.8	33
3.00	**0.747**	13.6	36
3.25	**0.809**	14.4	39
3.50	**0.871**	15.2	42

LEGEND

VFD — Variable Frequency Drive

50EJQ,EWQ UNITS

NOTE: Unit is shipped with default values that can be changed through Service Tool or CCN software.

Cooling — On power up, the control module will activate the initialization software. The initialization software reads DIP switch no. 1 position to determine CV operation. Next, DIP switch no. 2 is read to determine if the control is TSTAT or sensor type operation. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for CV operation; sets maximum heat stages to 2; and sets maximum cool stages to 3. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation.

The TSTAT function performs a thermostat based control by monitoring Y1, Y2, W1, W2 and G inputs. These functions control stages: cool1, cool2, heat1, heat2, and the indoor fan respectively. If the TSTAT function is not selected, the control module determines the occupancy state based on the system time schedules or with remote occupied/unoccupied input. If Temperature Compensated Start is active, the unit will be controlled as in the Occupied mode.

Occupied or unoccupied comfort set points must be selected. Use of the space temperature offset input can also be configured. The control module will set appropriate operating mode and fan control. The control module will turn on indoor fan if in Occupied mode or if the unit is in Unoccupied mode and the space temperature is outside of the unoccupied comfort set points (Unoccupied Heat or Unoccupied Cool). The control module will then monitor space temperature against comfort set points and control heating or cooling stages as required. If the system is in the Occupied mode, the economizer will operate as required. If the system is in Unoccupied mode, the system will perform nighttime free cool and IAQ (indoor air quality) pre-occupancy purge as required (when functions are enabled via software). Whenever the DX (direct expansion) cooling is requested, the outdoor fan will operate.

The control module will operate economizer, run diagnostics to monitor alarms/alerts at all times, and respond to CCN communications to perform any configured network POC (product outboard control) functions such as time/outdoor-air temperature broadcast and global occupancy broadcast. When the optional expansion I/O board is employed, it will: perform a periodic scan and maintain a database of expanded I/O points; perform Fire/Smoke control (power exhaust required); if in Occupied mode, perform IAQ control and monitor the fan, filter, demand limit, and field-applied status (with accessories).

If thermostats are used to energize the G input, the control module will turn on the indoor fan without delay and open the economizer dampers to minimum position. If thermostats are used to deenergize the G input, the control module will turn off the indoor fan without delay and close the economizer dampers.

When cooling, G must be energized before cooling can operate. The control module determines if outdoor conditions are suitable for economizer cooling using the standard outdoor air thermistor. For the economizer to function for outside air cooling: the enthalpy must be below the enthalpy set point; the outdoor-air temperature must be equal to or less than the High Outdoor Air Temperature Lockout (default is 65 F); the SAT (supply-air temperature) thermistor must not be in alarm; and the outdoor air reading is available. When these conditions are satisfied, the control module will use economizer as the first stage of cooling.

When Y1 input is energized, the economizer will be modulated to maintain SAT at the defined set point. (The default is 55 F.) When SAT is above the set point, the economizer will be 100% open. When SAT is below the set point, the economizer will modulate between minimum and 100% open position. When Y2 is energized, the control module will turn on compressor 1 and continue to modulate the economizer as described above. If the Y2 remains energized and the SAT reading remains above the set point for 15 minutes, compressor 2 will turn on. If Y2 is deenergized at any time, only the last stage of compression that was energized will be turned off. If outdoor conditions are not suitable for economizer cooling, the economizer will go to minimum position and cycle compressors 1 and 2 based on demand from Y1 and Y2 respectively. The compressors will be locked out when the SAT temperature is too low (less than 40 F for compressor 1 and less than 45 F for compressor 2). After a compressor is locked out, it can restart after normal Time Guard® period.

The Time Guard function maintains a minimum off time of 5 minutes, a minimum on time of 10 seconds, and a minimum delay before starting the second compressor of 10 seconds.

Heating — The control module is powered by 24 vac. If the unit is controlled with a room sensor, the fan will run continuously in the Occupied mode, with the outside-air damper in the minimum position. If the unit is controlled through a room thermostat (with FAN set to AUTO), upon a call for heat the first stage heat is energized, energizing heat relay (HR2) and reversing valve solenoids (RVS1 and 2). Compressor no. 1 and 2, indoor and outdoor-fan motors start. Upon a call for additional heat (if equipped with electric heaters), the second stage of heat is energized. When the call for heat is satisfied, the compressors, fan motors, and heaters will be deenergized and the outdoor-air damper will move to the closed position.

If the unit is controlled with a room sensor the fan will not run in the Unoccupied mode unless the space temperature is below the unoccupied heat set point or above the unoccupied cool set point. Upon a call for heat, the first stage of heat is energized, energizing heat relay (HR2) and reversing valve solenoids (RVS1 and 2). Compressor no. 1 and 2, indoor and outdoor-fan motors start, and the outdoor-air damper will move to the Unoccupied IAQ position (generally set to zero in the Unoccupied mode). The IAQ feature is enabled through system software. Upon a call for additional heat (if equipped with electric heaters), the second stage of heat is energized. When the call for heat is satisfied, the compressors, fan motors, and heaters will be deenergized and the outdoor-air damper will move to the closed position.

Defrost Cycle — When the temperature of the outdoor coil drops below 28 F as sensed by the defrost thermostat (DFT1 or 2) and the defrost timer is at the end of a timed period (adjustable at 30 to 90 minutes) the defrost cycle will begin. The control board will deenergize the reversing valve solenoids (RVS1 and 2) and energize the electric heat. Also, the outdoor-fan motor will stop.

The unit will continue to defrost until the coil temperature as measured by DFT1 and 2 reaches 65 F or the duration of defrost cycle completes a 10-minute period.

During the defrost mode, if a circuit defrosts first, the RVS will oscillate between heating and cooling modes until defrost mode is complete. This will keep the head pressure on that circuit from getting too high.

At the end of the defrost cycle, the electric heaters will be deenergized, reversing valve solenoids will be energized, and the outdoor fan will start.

POWER EXHAUST OPERATION

Power exhaust has two options (Constant Volume and Modulating) that have the following sequence of operation:

The first stage of constant volume (CV) power exhaust is enabled when the indoor fan has been energized and the desired damper position for the economizer increases above the CV power exhaust set point (PES1). The default for PES1 is set at 25%. The second stage of power exhaust is enabled when the desired damper position for the economizer increases above the second CV power exhaust set point (PES2). The default for PES2 is set at 75%. Each stage is disabled when the desired damper position decreases below the respective set points.

The modulating power exhaust is enabled when the indoor fan is energized and the building pressure has exceeded the individual sequencer set points. The default set points are 0.04 in. wg (9.9 Pa) (6.3 vdc) for stage 1, 0.10 in. wg (24.9 Pa) (6.8 vdc) for stage 2, 0.16 in. wg (39.8 Pa) (7.3 vdc) for stage 3, 0.23 in. wg (57.1 Pa) (7.8 vdc) for stage 4, 0.29 in. wg (72.0 Pa) (8.3 vdc) for stage 5, and 0.35 in. wg (86.9 Pa) (8.8 vdc) for stage 6 power exhaust sequencer. Each stage also requires that the building pressure is reduced until it drops below the disable set point. The default set points are 0 in. wg (0 Pa) (6.0 vdc) for stage 1, 0.060 in. wg (14.9 Pa) (6.5 vdc) for stage 2, 0.13 in. wg (32.3 Pa) (7.0 vdc) for stage 3, 0.19 in. wg (47.2 Pa) (7.4 vdc) for stage 4, 0.25 in. wg (47.5 Pa) (8.0 vdc) for stage 5, and 0.31 in. wg (62.4 Pa) (8.5 vdc) for stage 6 power exhaust sequencer. Both of these set points are changed at the specific controlling sequencer.

SMOKE CONTROL MODES

The 48/50EJ,EK,EW,EY and 50EJQ,EWQ units with an optional expansion board perform fire and smoke control modes. The expansion board provides 4 modes which can be used to control smoke within the conditioned area. The modes of operation are fire shutdown, pressurization, evacuation, and smoke purge. See Table 3.

SMOKE DETECTOR

A smoke detector can be used to initiate fire shutdown. This can be accomplished by a set of normally closed pilot relay contacts which will interrupt power from the 24-v transformer, secondary ''B'' terminal to the control circuit breaker (CB4). The wire that connects these two points is white and labeled ''W78.''

NOTE: On standard gas models, the indoor fan will continue to run 45 seconds after the call for heat has been terminated. If fire shutdown is initiated the fan will stop immediately. No 45-second delay will occur.

The smoke detector may be mounted in the return-air duct or the supply duct. Carrier does not make recommendations as to specific smoke detector location due to liability considerations.

IAQ CONTROL

The accessory expansion board and accessory IAQ (indoor air quality) sensor are required for IAQ control. The Carrier sensors operate with a 4 to 20 mA signal. The 4 to 20 mA signal is connected to T11 (+) and T12 (−) on the expansion board for the IAQ sensor, and T13 (+) and T14 (−) on the expansion board for the OAQ (outdoor air quality) sensor. The sensor is field-mounted and wired to the expansion board installed in the unit main control box. The IAQ sensor must be powered by a field-supplied 24-v power supply (ungrounded). Do not use the unit 24-v power supply to power the sensor.

Once installed, the sensor must be enabled via unit software access. The sensor is configured with default values which may be changed through network access software. To work properly, the IAQ sensor high and low reference points for the sensor that is used must match the configured values. The expansion board reacts to a 4 to 20 mA signal from the IAQ sensor. The low reference (4 mA output) must be configured to the minimum IAQ sensor reading. The high reference (20 mA output) must be configured to the maximum IAQ sensor reading.

The IAQ sensor can be configured to either low or high priority. The priority value can be changed by the user. The default is low.

Low Priority — When the priority is set to low, the initial control is to the IAQ set point, but the outside air damper position will change to its minimum position when the following conditions occur:

- CV units with sensor — when the space temperature is greater than the occupied cooling set point plus 2° F or when the space temperature is less than the occupied heating set point minus 2° F.
- VAV units and CV units with thermostat — when the supply-air temperature is less than the supply-air temperature set point minus 8° F or when the supply-air temperature is greater than the supply air temperature set point plus 5° F for 4 minutes.
- When the outdoor air quality is greater than the outdoor air quality set point (ppm)

High Priority — When the priority is set to high, the IAQ set point controls the outside air damper exclusively, with no regard to comfort conditioning.

Table 3 — Smoke Control Modes

DEVICE	PRESSURIZATION	SMOKE PURGE	EVACUATION	FIRE SHUTDOWN
Economizer	100%	100%	100%	0%
Indoor Fan/VFD	ON	ON	OFF	OFF
Power Exhaust (all outputs)	OFF	ON	ON	OFF
Heat Stages	OFF	OFF	OFF	OFF
HIR	ON	ON	OFF	OFF

LEGEND

HIR — Heat Interlock Relay
VFD — Variable Frequency Drive

I/O CHANNEL DESIGNATIONS BASE MODULE — CV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10KΩ Thermistor	**T23-25**	Compressor 2 Safety — DI (24 vac)
T3-4	STO (CCN) — 10KΩ Thermistor	**T24-25**	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5KΩ Thermistor	**T26-27**	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5KΩ Thermistor	**T28-29**	Heat 1 Relay — DO (24 vac)
T9-10	—	**T30-29**	Heat 2 Relay — DO (24 vac)
T11-12	SAT Reset — AI (4 to 20 mA)	**T31-32**	CV Power Exhaust 1/Modulating Power Exhaust — DO (115 vac)
T13-14	—	**T33-32**	CV Power Exhaust 2 — DO (115 vac)
T15-16	—	**T34-35**	Condenser Fan — DO (115 vac)
T17-25	Y1 or Remote Start/Stop — DI (24 vac)	**T36-35**	OFC2 — DO (115 vac)
T18-25	Y2 — DI (24 vac)	**T37-38**	—
T19-25	W1 — DI (24 vac)	**T39-38**	—
T20-25	W2 — DI (24 vac)	**K1**	Indoor Fan Relay — DO (LV)
T21-25	G — DI (24 vac)	**K2**	Compr. 1 — DO (HV)
T22-25	Compressor 1 Safety — DI (24 vac)	**K3**	Compr. 2 — DO (HV)

I/O CHANNEL DESIGNATIONS BASE MODULE — VAV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10KΩ Thermistor	**T23-25**	Compressor 2 Safety — DI (24 vac)
T3-4	RAT — 5KΩ Thermistor	**T24-25**	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5KΩ Thermistor	**T26-27**	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5KΩ Thermistor	**T28-29**	Heat 1 Relay − DO (24 v)
T9-10	—	**T30-29**	Heat Interlock Relay — DO (24 v)
T11-12	SAT Reset — AI (4 to 20 mA)	**T31-32**	Modulated Power Exhaust — DO (24 vac)
T13-14	—	**T33-32**	—
T15-16	—	**T34-35**	Condenser Fan — DO (115 vac)
T17-25	Remote Start/Stop — DI (24 vac)	**T36-35**	OFC2 — DO (115 vac)
T18-25	—	**T37-38**	Unloader 1 — DO (115 vac)
T19-25	—	**T39-38**	Unloader 2 — DO (115 vac)
T20-25	—	**K1**	Indoor Fan Relay — DO (LV)
T21-25	—	**K2**	Compr. 1 — DO (HV)
T22-25	Compressor 1 Safety — DI (24 vac)	**K3**	Compr. 2 — DO (HV)

I/O CHANNEL DESIGNATIONS EXPANSION MODULE (Field-Installed) — CV AND VAV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	—	**T23 and TB2-1**	Fire — Evacuation — DI (24 vac)
T3-4	—	**T24 and TB2-1**	Fire — Smoke Purge — DI (24 vac)
T5-6	—	**T26-27**	—
T7-8	—	**T28-29**	—
T9-10	—	**T30 and TB2-2**	Alarm Light Indicator — DO (24 vac)
T11-12	IAQ Indoor — AI (4 to 20 mA)	**T31**	Power Exhaust Fire No. 1 — DO (115 vac)
T13-14	IAQ Outdoor — AI (4 to 20 mA)	**T33**	Power Exhaust Fire No. 2 — DO (115 vac)
T15-16	—	**T34**	Power Exhaust Fire No. 3 — DO (115 vac)
T17 and TB2-1	Fan Status — DI (24 vac)	**T36**	Power Exhaust Fire No. 4 — DO (115 vac)
T18 and TB2-1	Filter Status − DI (24 vac)	**T37**	Modulating Power Exhaust No. 5
T19 and TB2-1	Field Applied Status — DI (24 vac)	**T39**	Modulating Power Exhaust No. 6
T20 and TB2-1	Demand Limit — DI (24 vac)	**K1**	—
T21 and TB2-1	Fire — Unit Shutdown — DI (24 vac)	**K2**	—
T22 and TB2-1	Fire — Pressurization — DI (24 vac)	**K3**	—

LEGEND

AI — Analog Input
AO — Analog Output
CCN — Carrier Comfort Network
CV — Constant Volume
DI — Direct Input
DO — Direct Output
HV — High Voltage
IAQ — Indoor Air Quality
KΩ — Kilo-Ohms
LV — Low Voltage
OAT — Outdoor-Air Temperature
OFC — Outdoor Fan Contactor
RAT — Return-Air Temperature
SAT — Supply-Air Temperature
SPT — Space Temperature
STO — Space Temperature Offset
T — Terminal
TB — Terminal Block
VAV — Variable Air Volume

NOTE: All even numbered terminals are negative (−) polarity and all odd numbered terminals are positive (+) polarity.

LEGEND

AHA — Adjustable Heat Anticipator
BP — Building Pressure
BPS — Bypass Switch
BR — Burner Relay
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
CCB — Control Circuit Breaker
CCH — Crankcase Heater
CCN — Carrier Comfort Network
CLG — Cooling
COM — Communication
COMP — Compressor Motor
COMPR — Compressor Motor
CR — Control Relay
CV — Constant Volume
D — Diode
DFT — Defrost Thermostat
DIP — Dual In-Line Package
DM — Damper Motor
DP — Duct Pressure
EC — Enthalpy Control
EQUIP — Equipment
FLA — Full Load Amps
FPT — Freeze Protection Thermostat
FU — Fuse
GND — Ground
GRD — Ground
GVR — Gas Valve Relay
HC — Heater Contactor
HIR — Heat Interlock Relay
HPS — High-Pressure Switch
HR — Heater Relay
HS — Hall Effect Sensor
HTG — Heating
I — Ignitor
IAQ — Indoor Air Quality
IDM — Induced-Draft Motor
IFC — Indoor-Fan Contactor
IFCB — Indoor Fan Circuit Breaker
IFM — Indoor-Fan Motor
IFR — Indoor-Fan Relay
IGC — Intergrated Gas Unit Controller
INC — Increasing
IP — Internal Protector
L — Light
LED — Light-Emitting Diode
LPS — Low-Pressure Switch
LS — Limit Switch
MGV — Main Gas Valve
MMSN — Motormaster
NC — Normally Closed
NEC — National Electrical Code
NO — Normally Open
OAQ — Outdoor Air Quality
OAT — Outdoor-Air Thermostat
OCC — Occupied
OD — Outside Diameter
OFC — Outdoor-Fan Contactor
OFM — Outdoor-Fan Motor
PEC — Power Exhaust Contactor
PEM — Power Exhaust Motor
PES — Power Exhaust Sequencer
PESC — Power Exhaust Sequencer Controller
PL — Plug Assembly
R — Relay
RAT — Return-Air Thermistor
RS — Rollout Switch
RVS — Reversing Valve Solenoid
SAT — Supply-Air Thermistor
SIO — Serial Input/Output
SPT — Space Temperature Sensor
SW — Switch
T — Terminal
TB — Terminal Block
TC — Thermostat Cooling
TH — Thermostat Heating
TRAN — Transformer
UNOCC — Unoccupied
UL — Compressor Unloader
VAV — Variable Air Volume
VFD — Variable Frequency Drive

Terminal (Marked)
Terminal (Unmarked)
Terminal Block
Splice
Factory Wiring
Field Wiring
To indicate common potential only, not to represent wiring

NOTE FOR FIG. 3, 7, 8, 10, 17, 22, 23, 25, AND 26

1. The red and violet wires are spliced together at the factory. The brown wire has a wire nut added at the factory.

NOTES FOR FIG. 4 AND 12

1. Connect TRAN1 to H4 for 460-v units. Connect to H3 for 230-v. If 208/230-v units are run with a 208-v power supply, connect to H2.
2. Connect TRAN2 to black lead for 460-v units. Connect to orange lead for 230-v units. If 208/230-v units are run with a 208-v power supply, connect to red lead.
3. Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
4. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
5. Compressors and/or fan motors are thermally protected.
6. Three-phase motors are protected against primary single phasing conditions.

NOTES FOR FIG. 5 AND 13

1. Connect TRAN1 to H4 for 575-v units.
2. Connect TRAN2 to black lead for 575-v units.
3. Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
4. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
5. Compressors and/or fan motors are thermally protected.
6. Three-phase motors are protected against primary single phasing conditions.

NOTES FOR FIG. 9 AND 14

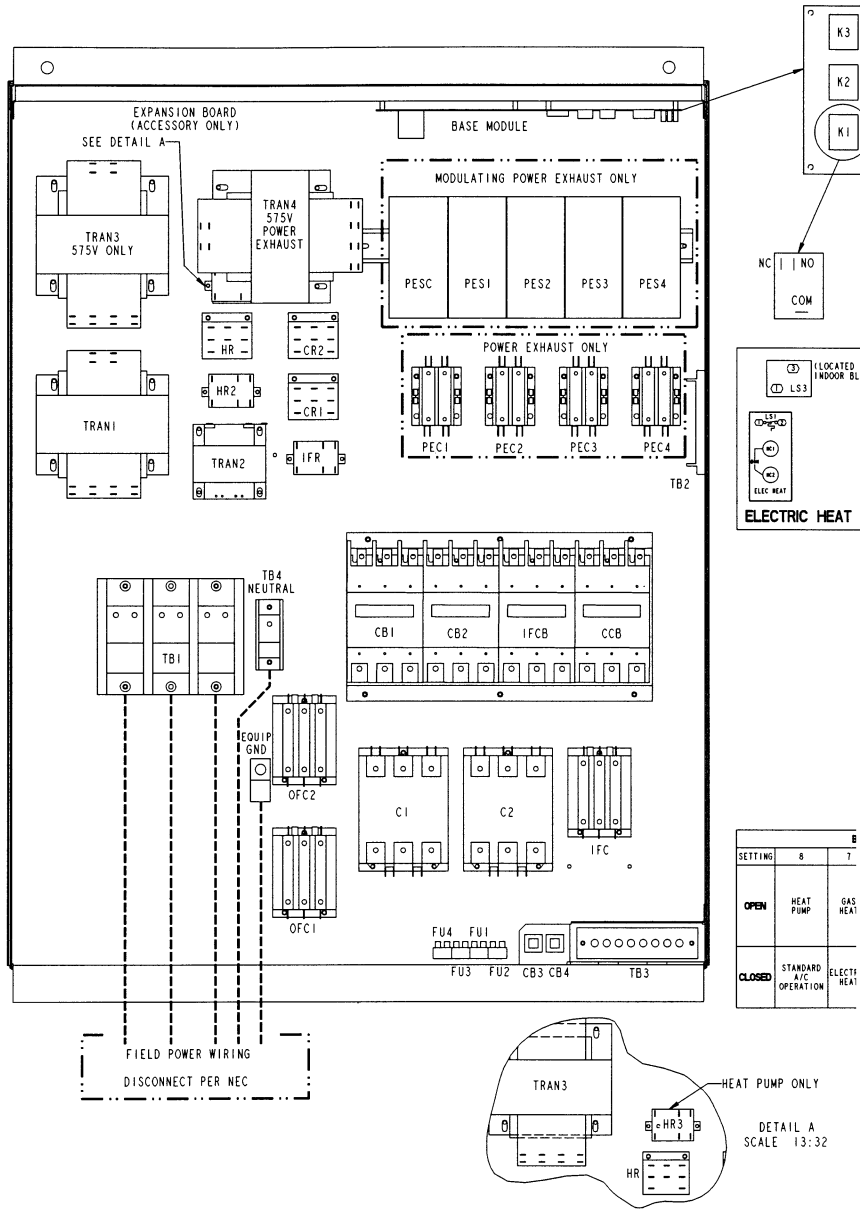
1. Connect TRAN1 to H3 for 380-v and 400-v units.
2. Connect TRAN2 to orange lead for 380-v and 400-v units.
3. Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
4. If any of the original wire furnished must be replaced, it must be replaced wit type 90 C wire or its equivalent.
5. Compressors and/or fan motors are thermally protected.
6. Three-phase motors are protected against primary single phasing conditions.

NOTES FOR FIG. 18

1. If 208/230-v units are run with a 208-v power supply, connect to H2.
2. If 208/230-v units are run with a 208-v power supply, connect to red lead.
3. Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
4. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
5. Fan motors are thermally protected.
6. Three-phase motors are protected against primary single phasing conditions.

NOTES FOR FIG. 19, 20, AND 24

1. Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
2. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
3. Fan motors are thermally protected.
4. Three-phase motors are protected against primary single phasing conditions.



FACTORY SETTINGS OF MODULATING POWER EXHAUST SEQUENCERS

	Offset	DIFF	OFF Voltage	ON Voltage	OFF Static	ON Static
Stage 1 (PES1)	50%	3%	6.0	6.3	0.00	0.04
Stage 2 (PES2)	55%	3%	6.5	6.8	0.06	0.10
Stage 3 (PES3)	60%	3%	7.0	7.3	0.12	0.16
Stage 4 (PES4)	64%	3%	7.4	7.7	0.18	0.22

ERROR CODE DESCRIPTION FOR CONTROL BOARD

LED Blinks	Error Mode
2	Compressor 1 Safety
3	Compressor 2 Safety
4	Thermostat Failure
5	SAT Thermistor Failure
6	OAT Thermistor Failure
7	SPT Thermistor Failure
8	RAT Thermistor Failure
9	Loss of Communications with Expansion Board
10	Control Board Failure
11	Expansion I/O Board Failure

ERROR CODE DESCRIPTION FOR IGC CONTROL BOARD

LED Blinks	Error Mode
ON	Normal Operation
OFF	Hardware Failure
1	Fan On/Off Delay Modified
2	Limit Switch Fault
3	Flame Sense Fault
4	Four Consecutive Limit Switch Faults
5	Ignition Lockout Fault
6	Induced Draft Motor Fault
7	Rollout Switch Fault
8	Internal Control Fault

NOTE: When W1 is energized the burners will remain on for a minimum of 60 seconds. If more than one error mode exists they will be displayed on the LED in sequence.

VFD SET POINTS FOR SUPPLY AIR PRESSURE

Pressure in. wg	Control Output mA	VFD Set Point
0.00	4.00	0.0
0.25	4.80	3.0
0.50	5.60	6.0
0.75	6.40	9.0
1.00	7.20	12.0
1.25	8.00	15.0
1.50	8.80	18.0
1.75	9.60	21.0
2.00	10.40	24.0
2.25	11.20	27.0
2.50	12.00	30.0
2.75	12.80	33.0
3.00	13.60	36.0
3.25	14.40	39.0
3.50	15.20	42.0

BASE MODULE CONTROL BOARD DIP SWITCH ASSIGNMENTS

Setting	1	2	3	4	5	6	7	8
Open	VAV	VAV Space Sensor Installed	Expansion I/O Board	Field Test On	VAV Occupied Heat Enabled	Time Guard® Override On	Gas Heat	Heat Pump
		CV, CCN or Sensors Used			CV Modulated Power Exhaust	In Conjunction with Field Test Set Minimum Damper Position On		
Closed	CV	VAV No Space Sensor	Base Control Board Only	Field Test Off	VAV Occupied Heat Disabled	Time Guard Override Off	Electric Heat	Standard A/C Operation
		CV Thermostat			CV Constant Volume Power Exhaust			

Fig. 1 — Component Arrangement — 48/50EJ,EK,EW,EY024-034 and 50EJQ,EWQ024,028 Units

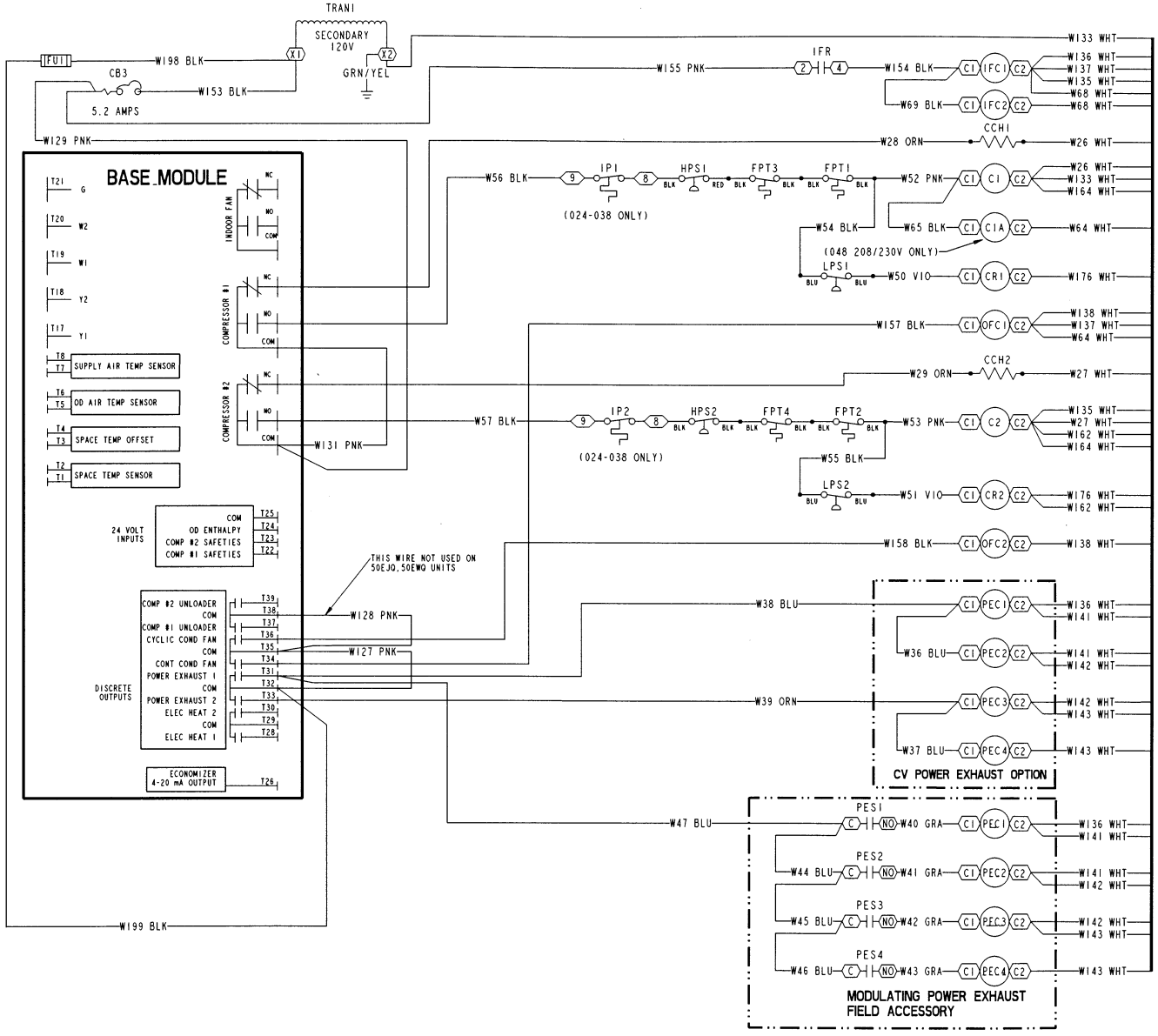


Fig. 2 — Control Circuit (120-V) — 48/50EJ,EW024-048 and 50EJQ,EWQ024,028 Units

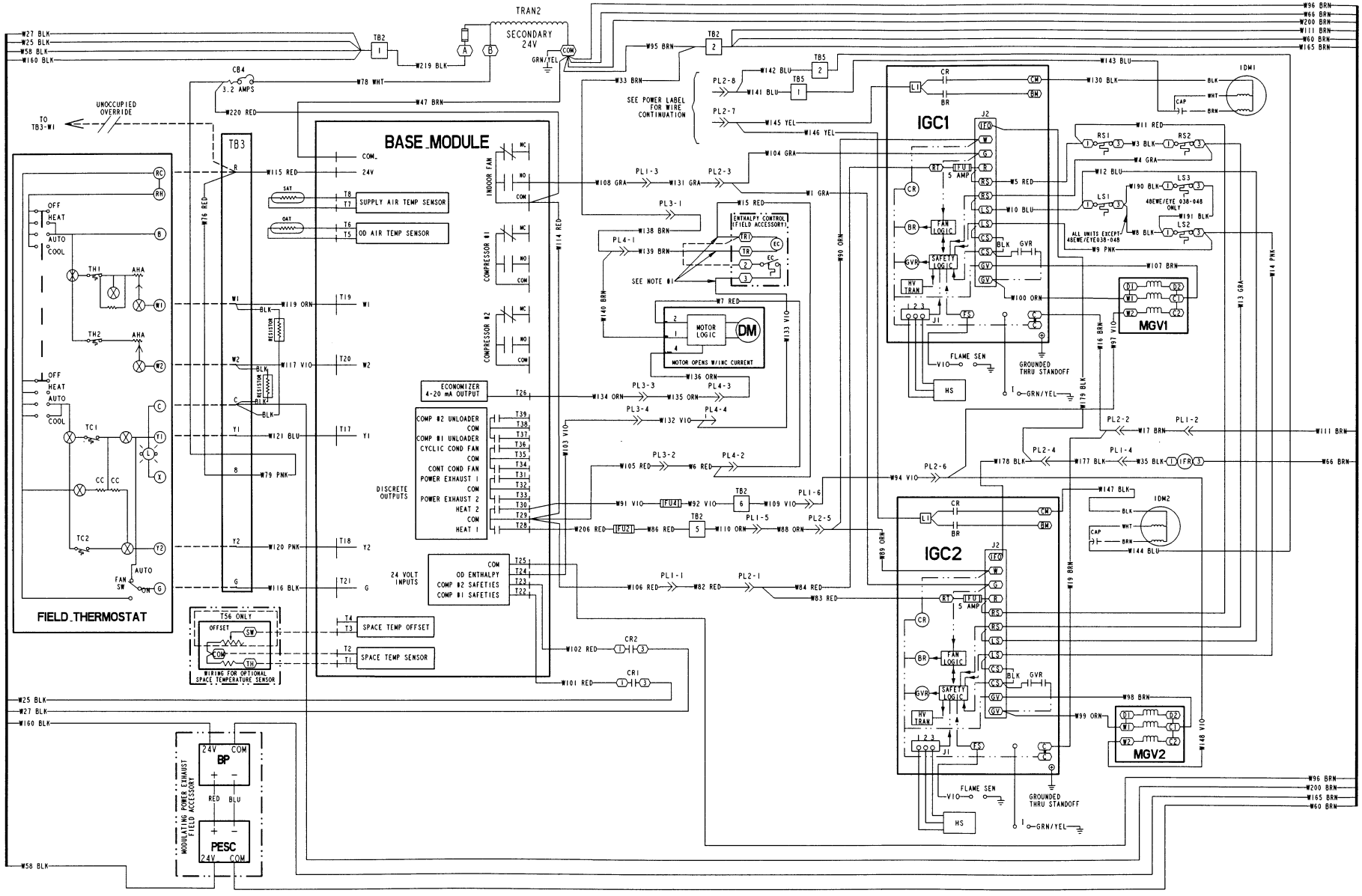


Fig. 3 — Control Circuit (24-V) — 48EJ,EW024-048 Units

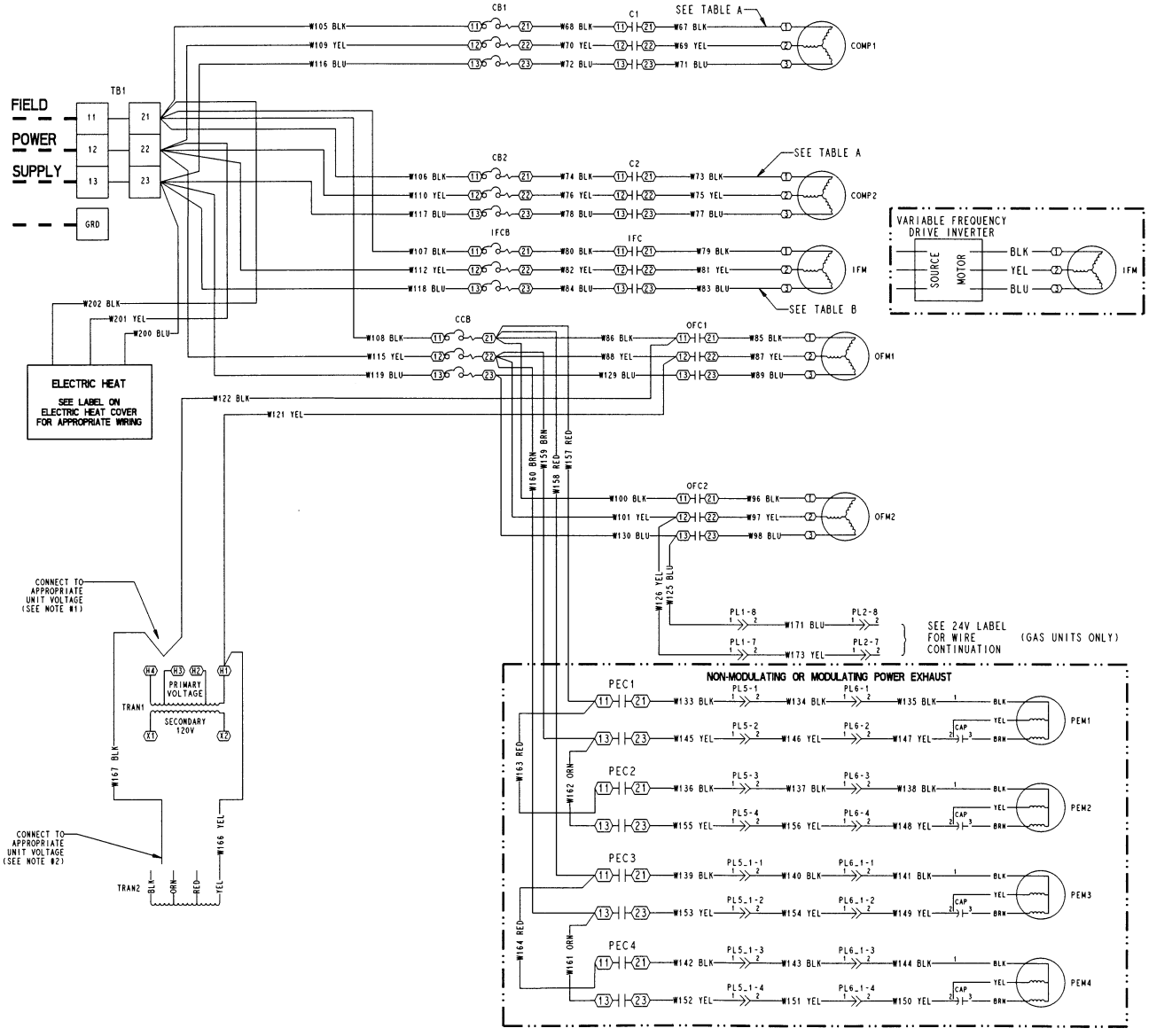


TABLE A

The Following Compressors Have Two Parallel Wires Run from TB1 to the Compressors

Compressor Model	Voltage	Wire Quantity
06D-537	208/230-3-60	2

TABLE B

The Following Fan Motors Have Two Parallel Wires Run from TB1 to the Fan Motors

Indoor Motor	Voltage	Wire Quantity
20 Hp	208/230-3-60	2

Fig. 4 — Power Schematic — 48/50EJ,EK,EW,EY024-034 and 50EJQ,EWQ024,028; 208/230-3-60 and 460-3-60 Units

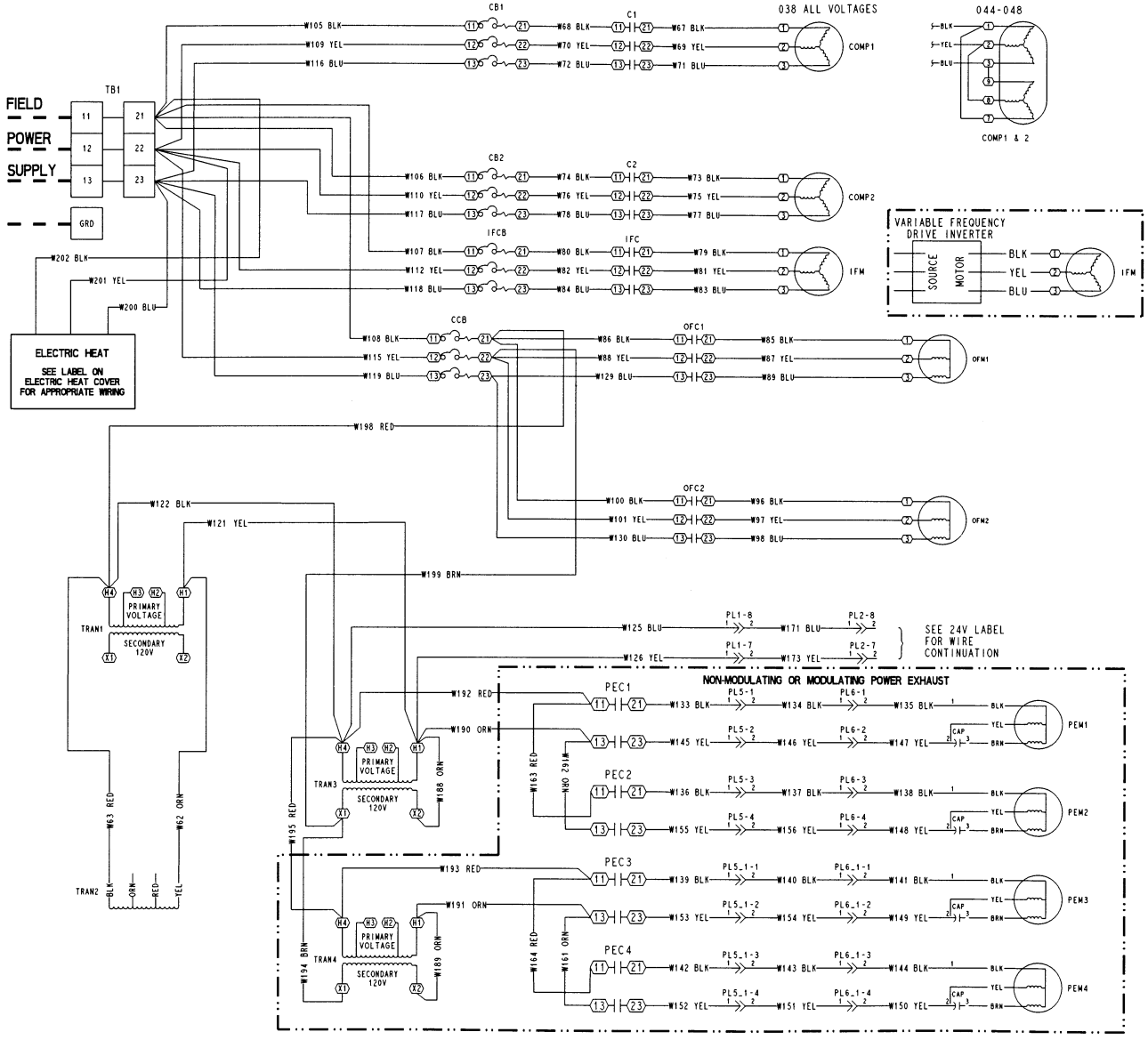


Fig. 5 — Power Schematic — 48/50EJ,EK,EW,EY024-034; 575-3-60 Units

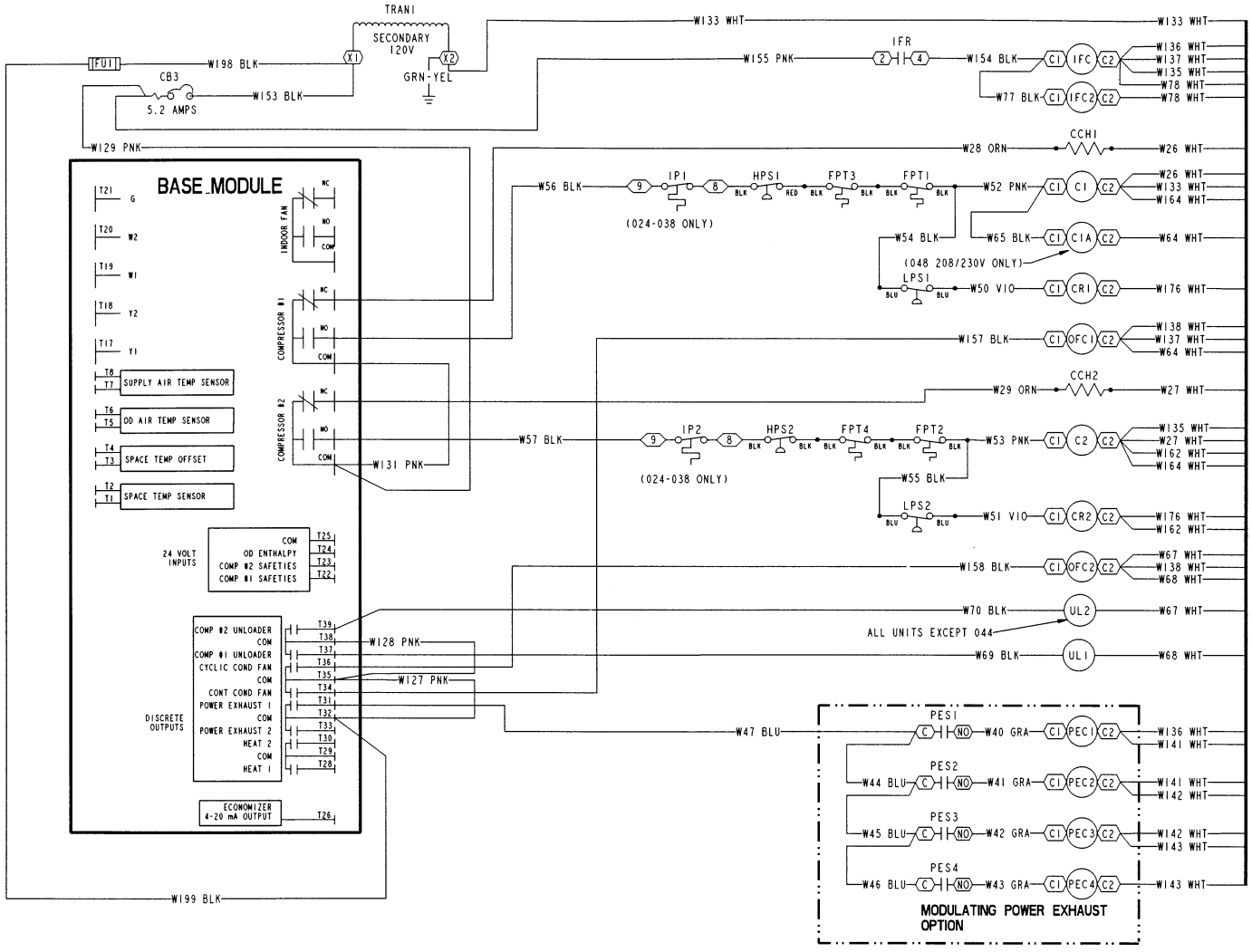


Fig. 6 — Control Circuit (120-V) — 48/50EK,EY024-048 Units

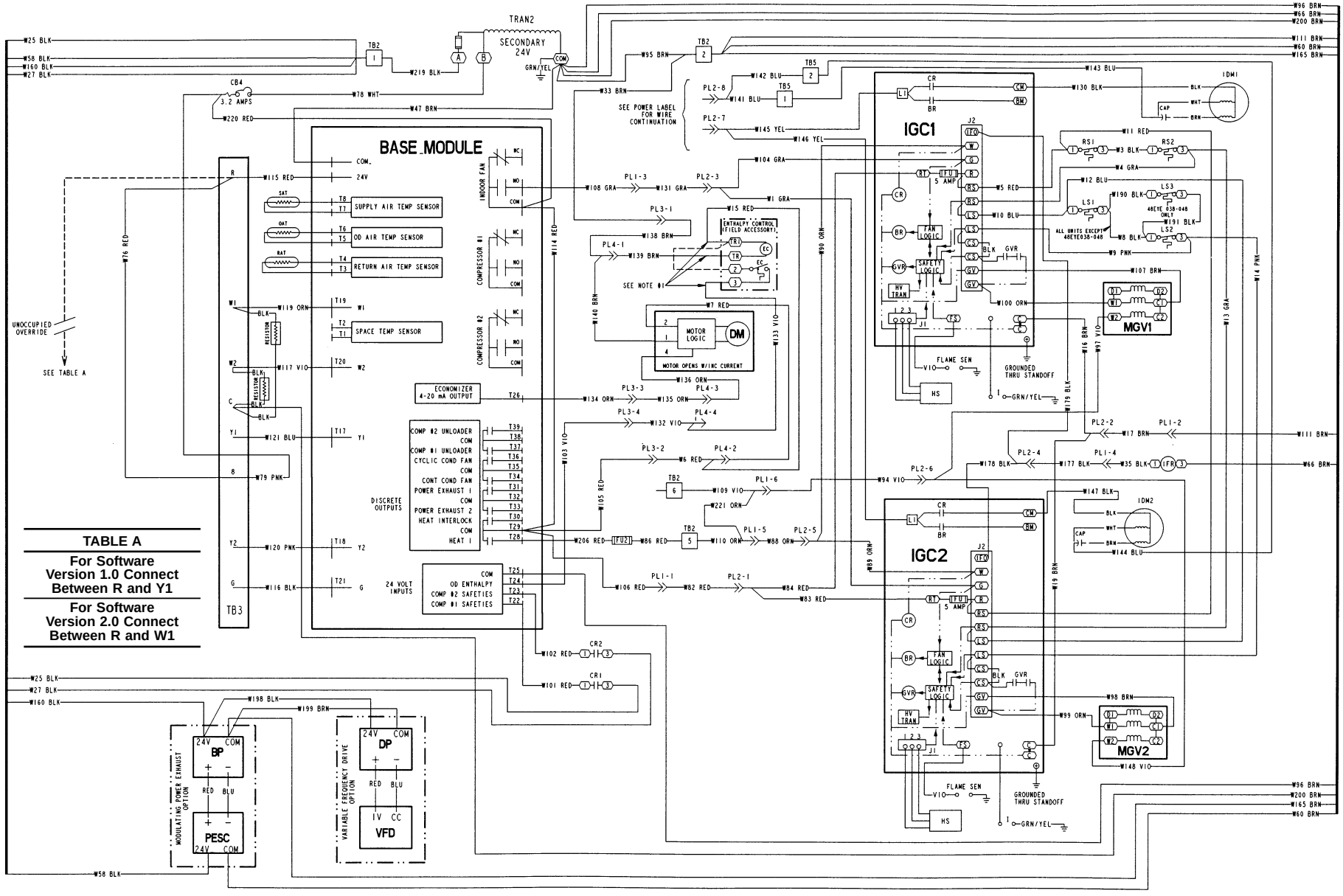


Fig. 7 — Control Circuit (24-V) — 48EK,EY024-048 Units

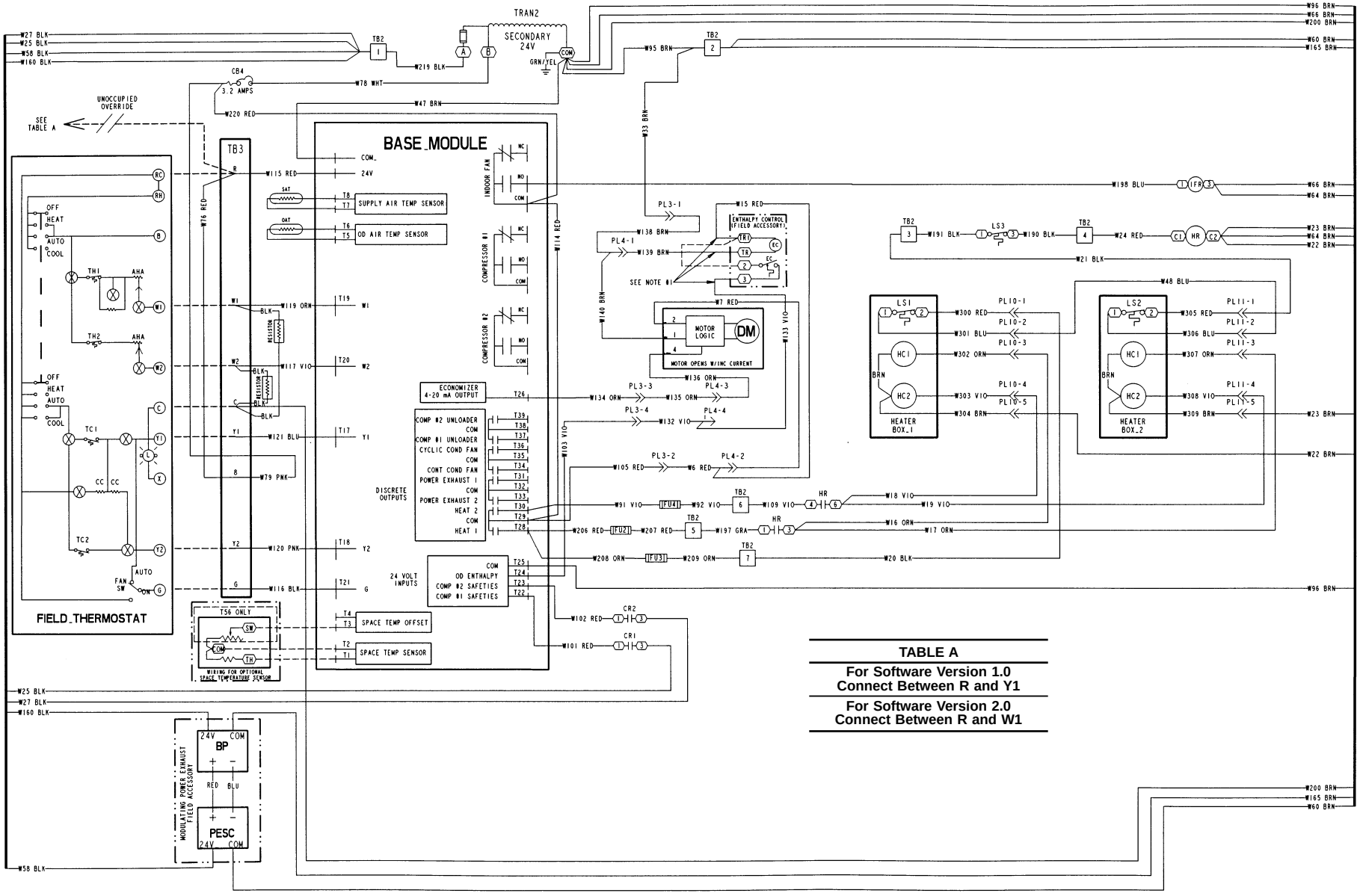


TABLE A

For Software Version 1.0 Connect Between R and Y1
For Software Version 2.0 Connect Between R and W1

Fig. 8 — Control Circuit (24-V) — 50EJ,EW024-048 Units

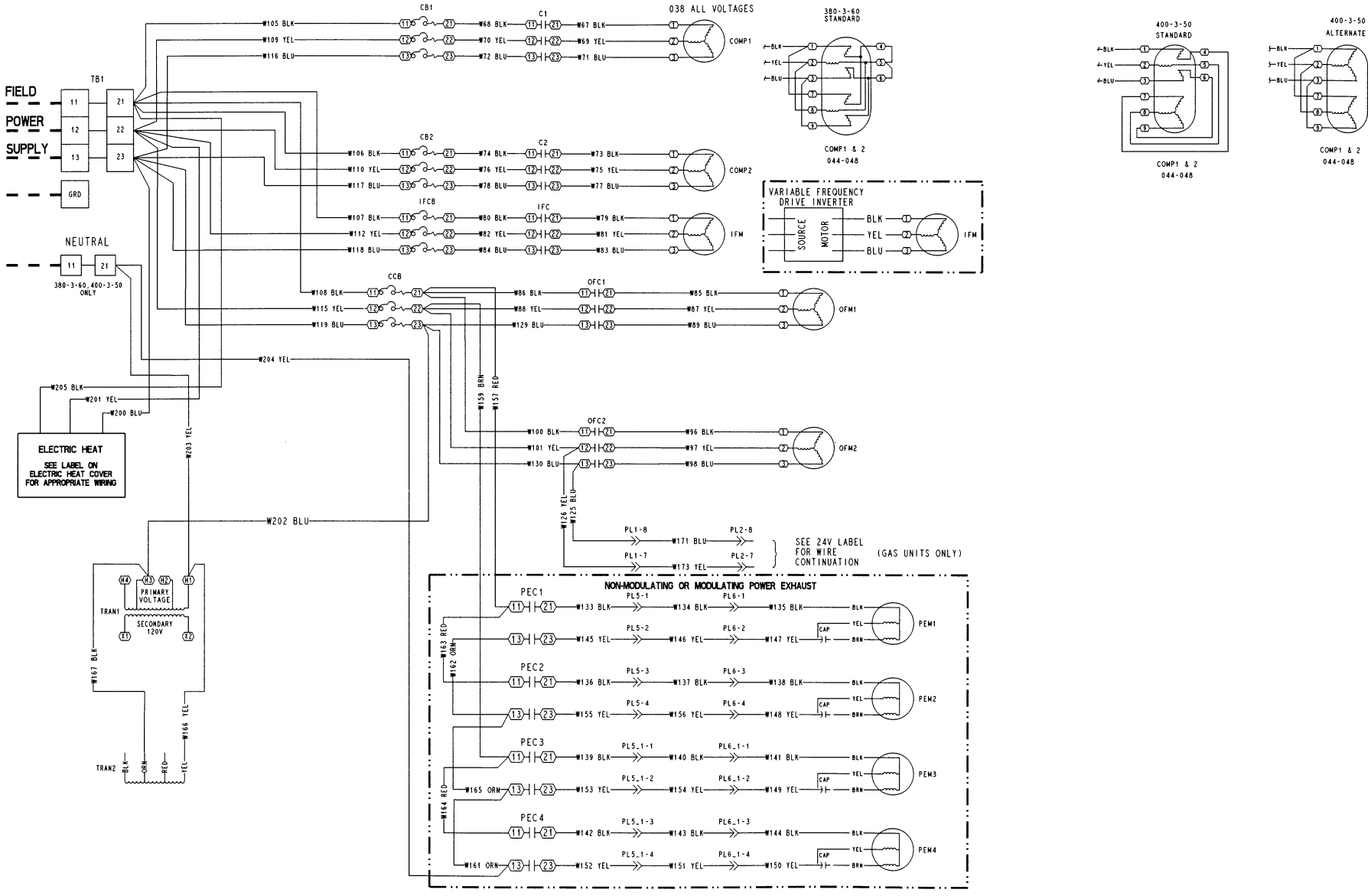


Fig. 9 — Power Schematic — 50EJ,EK,EW,EY024-034; 380-3-60 and 400-3-50 Units

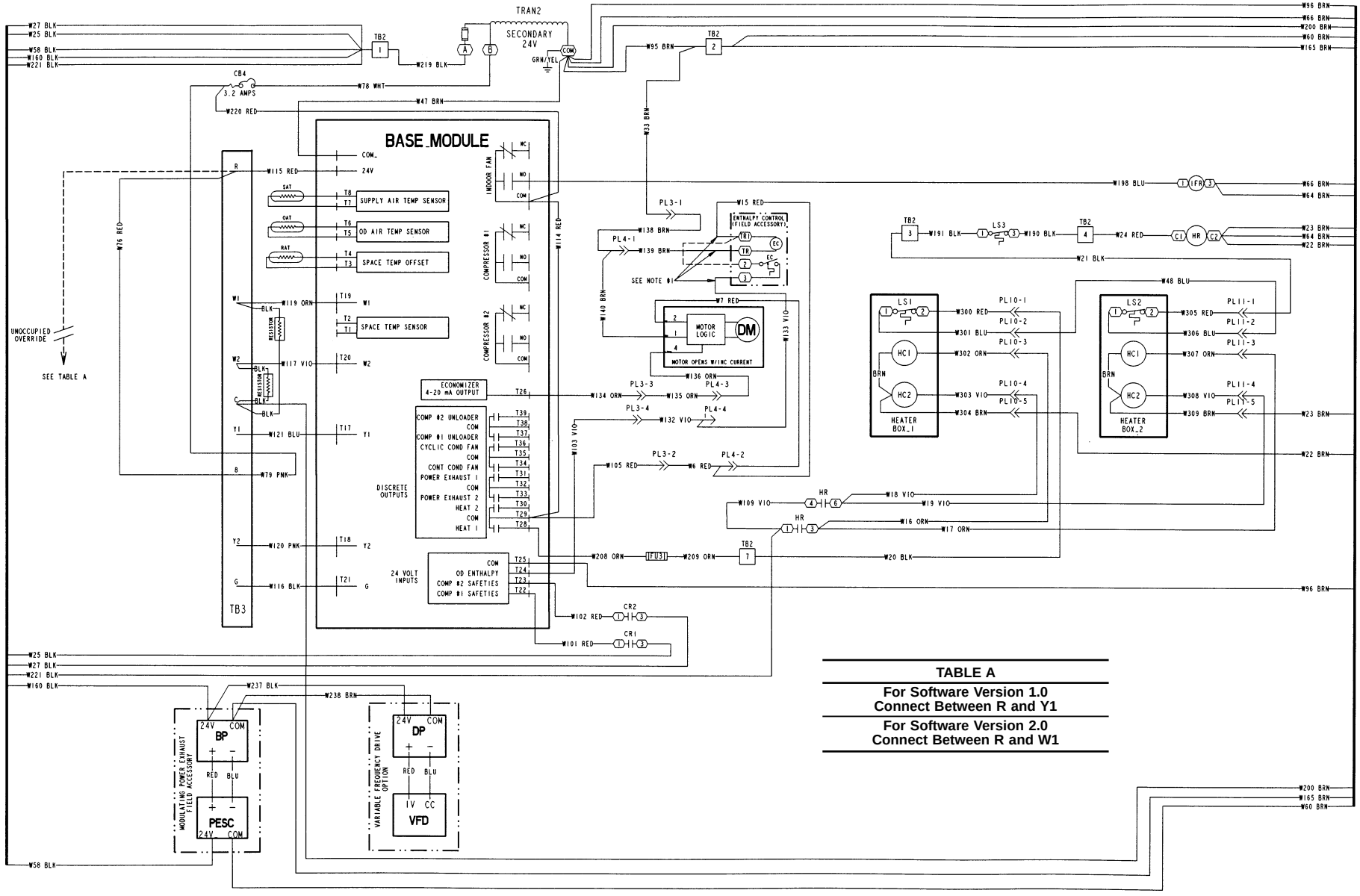


TABLE A
For Software Version 1.0 Connect Between R and Y1
For Software Version 2.0 Connect Between R and W1

Fig. 10 — Control Circuit (24-V) — 50EK,EY024-048 Units

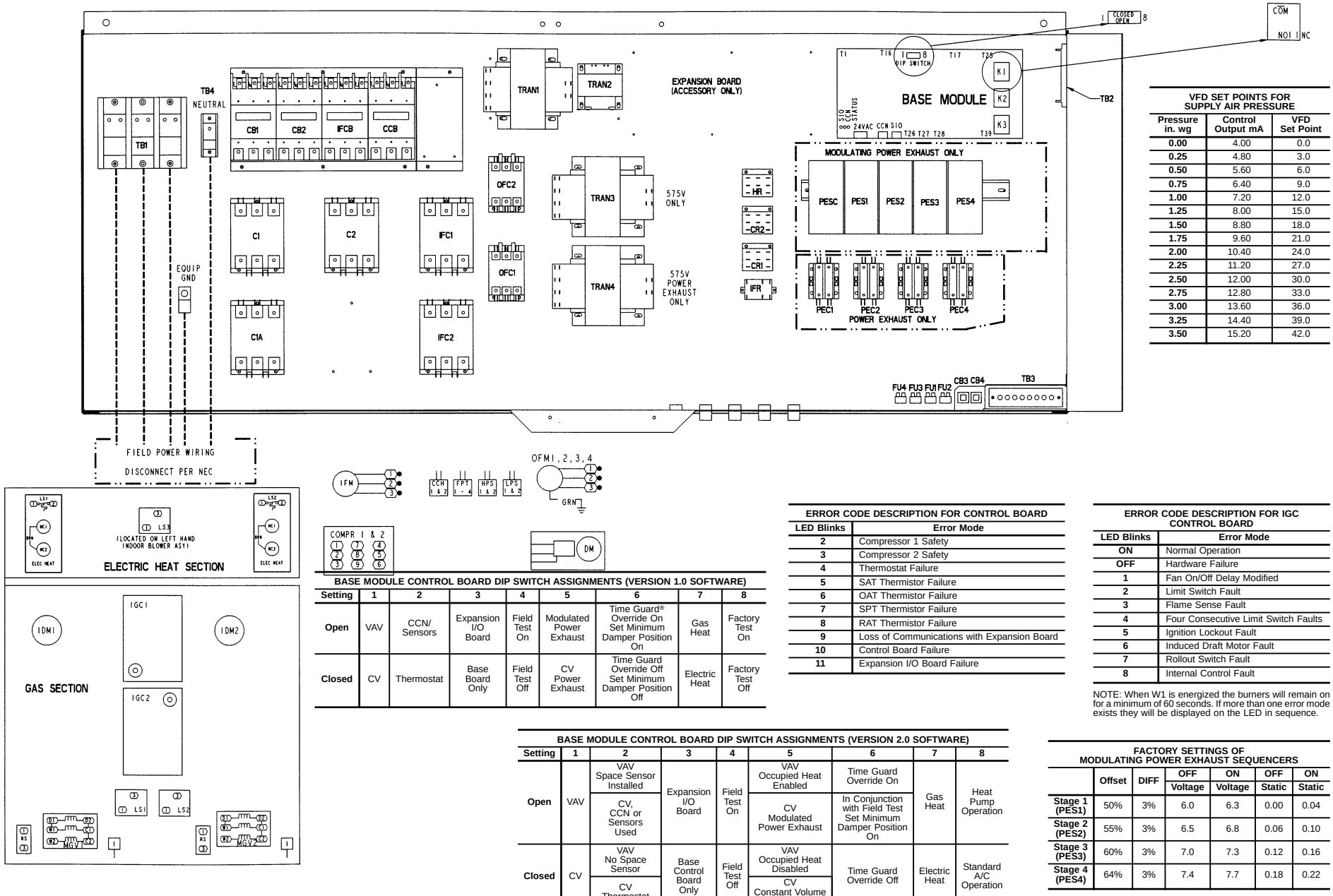


Fig. 11 — Component Arrangement — 48/50EJ,EK,EW,EY038-048

VFD SET POINTS FOR SUPPLY AIR PRESSURE

Pressure in. wg	Control Output mA	VFD Set Point
0.00	4.00	0.0
0.25	4.80	3.0
0.50	5.60	6.0
0.75	6.40	9.0
1.00	7.20	12.0
1.25	8.00	15.0
1.50	8.80	18.0
1.75	9.60	21.0
2.00	10.40	24.0
2.25	11.20	27.0
2.50	12.00	30.0
2.75	12.80	33.0
3.00	13.60	36.0
3.25	14.40	39.0
3.50	15.20	42.0

BASE MODULE CONTROL BOARD DIP SWITCH ASSIGNMENTS (VERSION 1.0 SOFTWARE)

Setting	1	2	3	4	5	6	7	8
Open	VAV	CCN/ Sensors	Expansion I/O Board	Field Test On	Modulated Power Exhaust	Time Guard® Override On Set Minimum Damper Position On	Gas Heat	Factory Test On
Closed	CV	Thermostat	Base Board Only	Field Test Off	CV Power Exhaust	Time Guard Override Off Set Minimum Damper Position Off	Electric Heat	Factory Test Off

ERROR CODE DESCRIPTION FOR CONTROL BOARD

LED Blinks	Error Mode
2	Compressor 1 Safety
3	Compressor 2 Safety
4	Thermostat Failure
5	SAT Thermistor Failure
6	OAT Thermistor Failure
7	SPT Thermistor Failure
8	RAT Thermistor Failure
9	Loss of Communications with Expansion Board
10	Control Board Failure
11	Expansion I/O Board Failure

ERROR CODE DESCRIPTION FOR IGC CONTROL BOARD

LED Blinks	Error Mode
ON	Normal Operation
OFF	Hardware Failure
1	Fan On/Off Delay Modified
2	Limit Switch Fault
3	Flame Sense Fault
4	Four Consecutive Limit Switch Faults
5	Ignition Lockout Fault
6	Induced Draft Motor Fault
7	Rollout Switch Fault
8	Internal Control Fault

NOTE: When W1 is energized the burners will remain on for a minimum of 60 seconds. If more than one error mode exists they will be displayed on the LED in sequence.

BASE MODULE CONTROL BOARD DIP SWITCH ASSIGNMENTS (VERSION 2.0 SOFTWARE)

Setting	1	2	3	4	5	6	7	8
Open	VAV	VAV Space Sensor Installed	Expansion I/O Board	Field Test On	VAV Occupied Heat Enabled	Time Guard Override On	Gas Heat	Heat Pump Operation
		CV, CCN or Sensors Used			CV Modulated Power Exhaust	In Conjunction with Field Test Set Minimum Damper Position On		
Closed	CV	VAV No Space Sensor	Base Control Board Only	Field Test Off	VAV Occupied Heat Disabled	Time Guard Override Off	Electric Heat	Standard A/C Operation
		CV Thermostat			CV Constant Volume Power Exhaust			

FACTORY SETTINGS OF MODULATING POWER EXHAUST SEQUENCERS

	Offset	DIFF	OFF Voltage	ON Voltage	OFF Static	ON Static
Stage 1 (PES1)	50%	3%	6.0	6.3	0.00	0.04
Stage 2 (PES2)	55%	3%	6.5	6.8	0.06	0.10
Stage 3 (PES3)	60%	3%	7.0	7.3	0.12	0.16
Stage 4 (PES4)	64%	3%	7.4	7.7	0.18	0.22

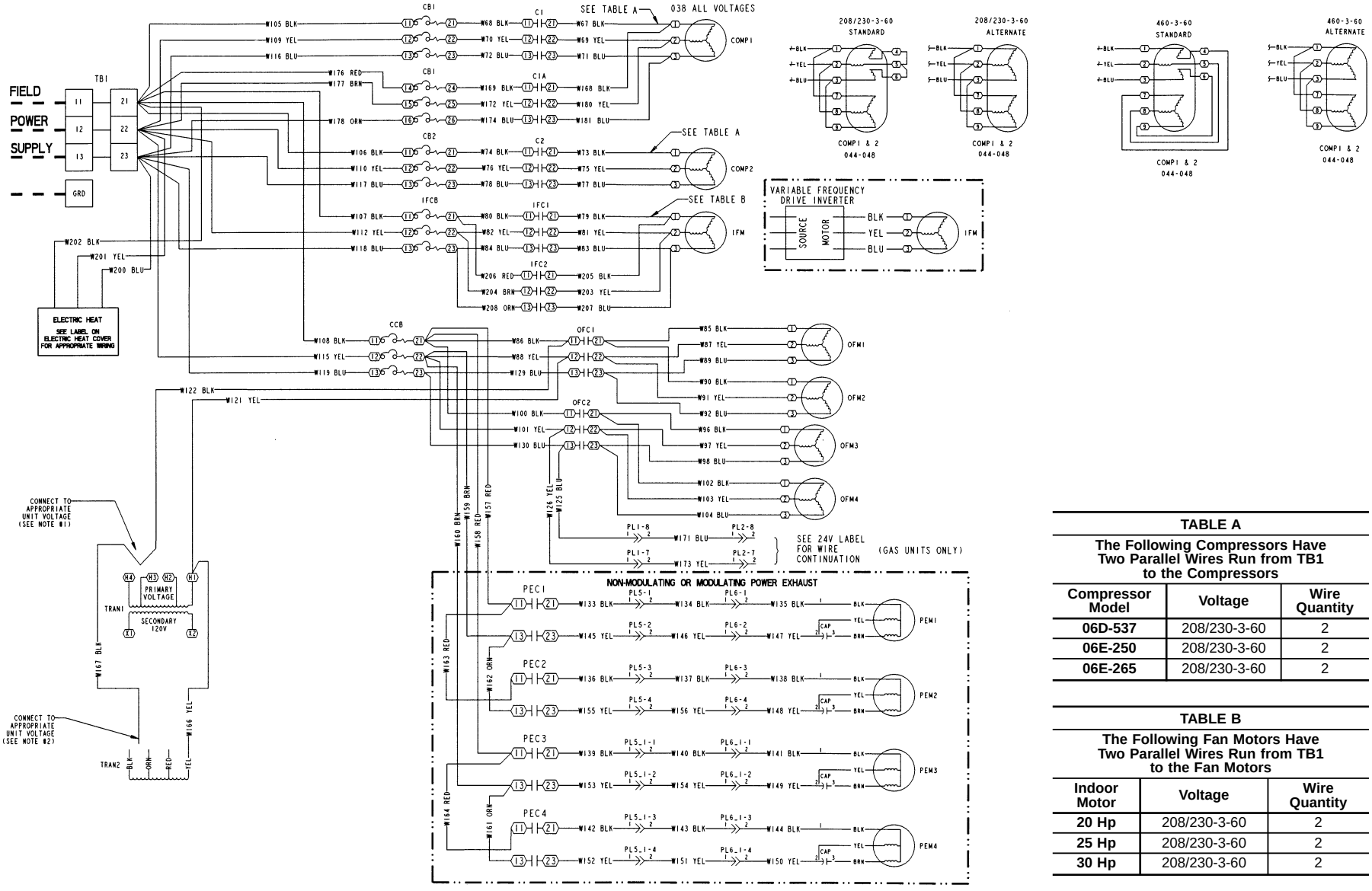


TABLE A

The Following Compressors Have Two Parallel Wires Run from TB1 to the Compressors

Compressor Model	Voltage	Wire Quantity
06D-537	208/230-3-60	2
06E-250	208/230-3-60	2
06E-265	208/230-3-60	2

TABLE B

The Following Fan Motors Have Two Parallel Wires Run from TB1 to the Fan Motors

Indoor Motor	Voltage	Wire Quantity
20 Hp	208/230-3-60	2
25 Hp	208/230-3-60	2
30 Hp	208/230-3-60	2

Fig. 12 — Power Schematic — 48/50EJ,EK,EW,EY038-048; 208/230-3-60 and 460-3-60 Units

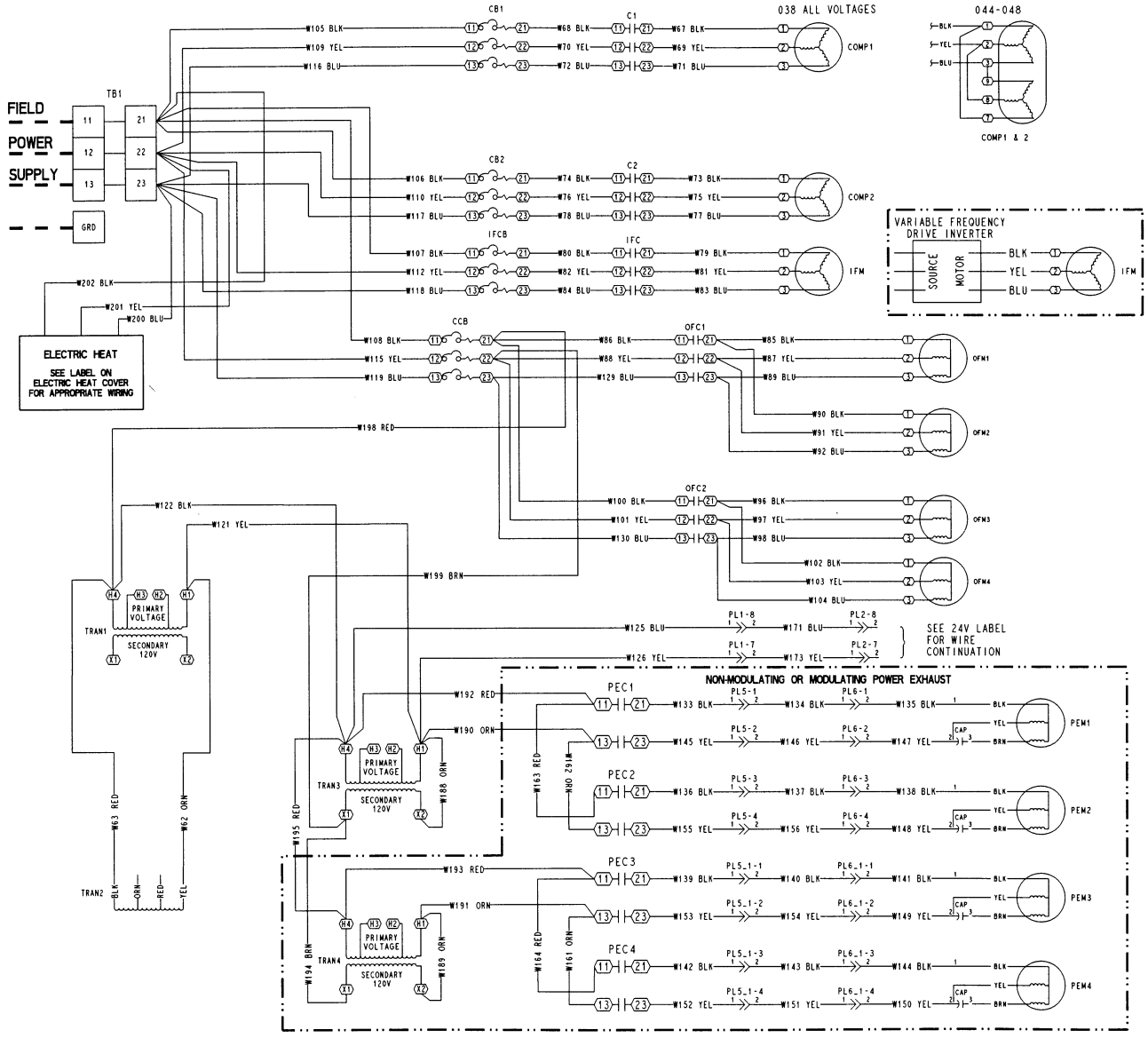


Fig. 13 — Power Schematic — 48/50EJ,EK,EW,EY038-048; 575-3-60 Units

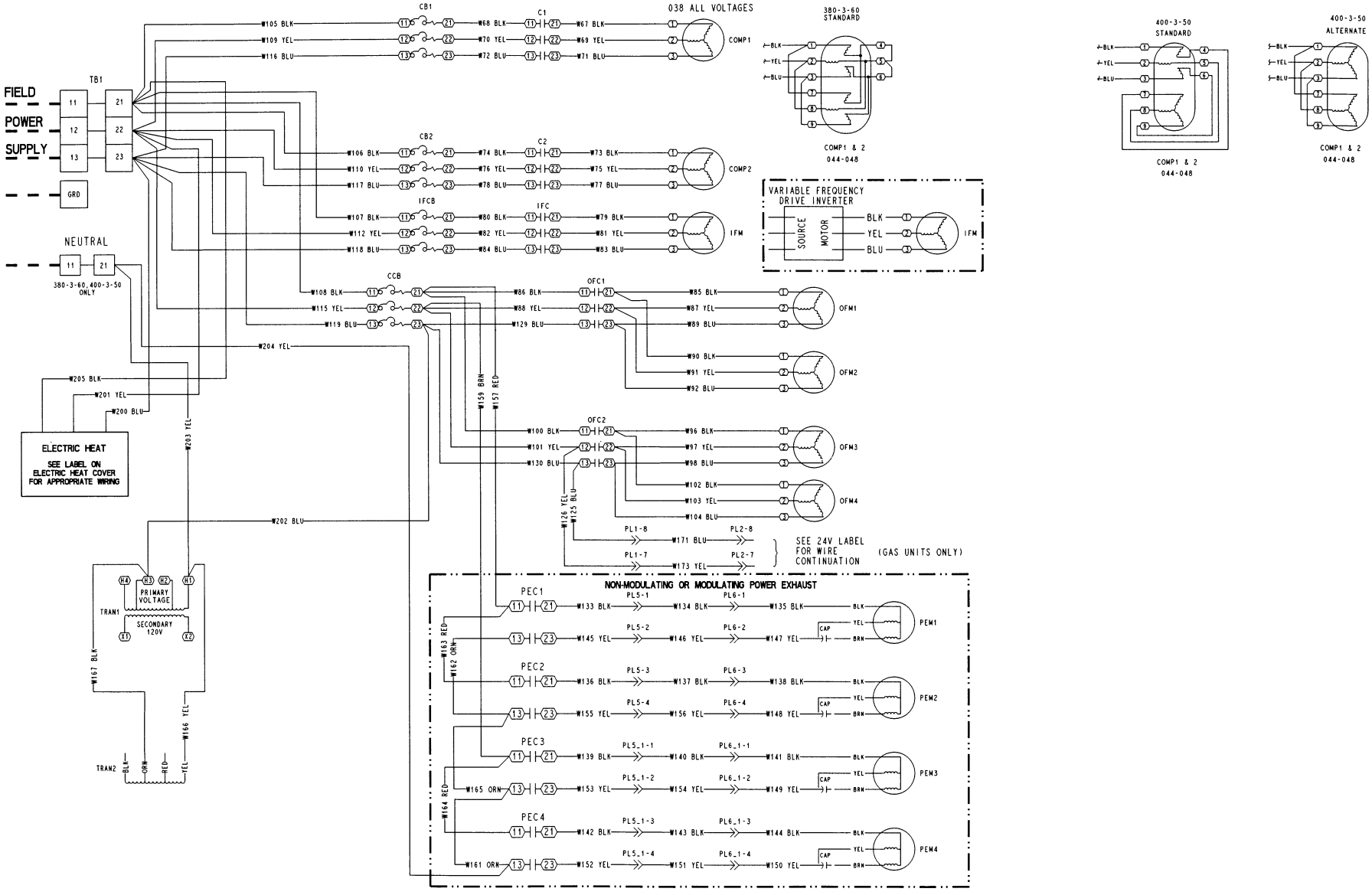
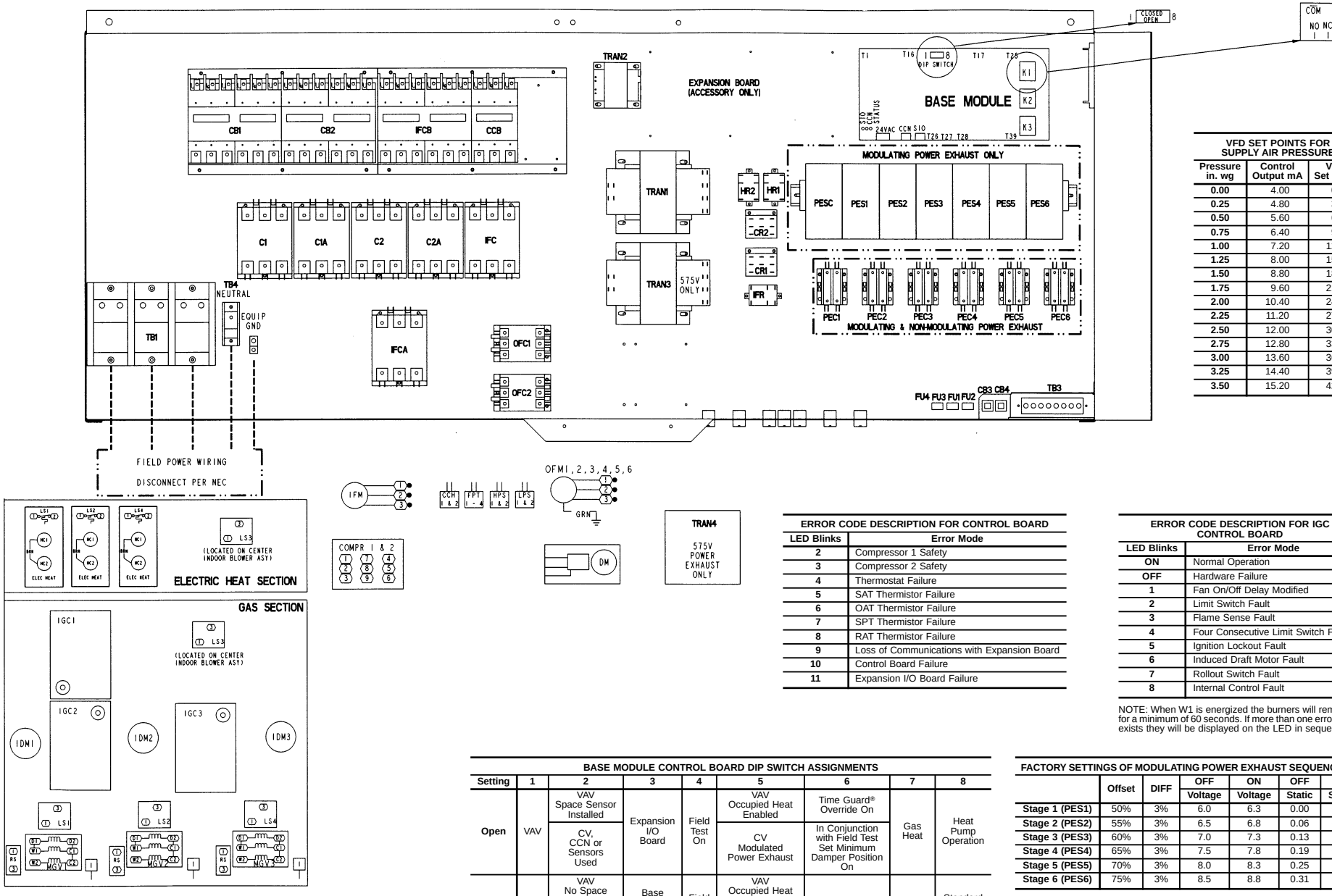


Fig. 14 — Power Schematic — 50EJ,EK,EW,EY038-048; 380-3-60 and 400-3-50 Units



VFD SET POINTS FOR SUPPLY AIR PRESSURE

Pressure in. wg	Control Output mA	VFD Set Point
0.00	4.00	0.0
0.25	4.80	3.0
0.50	5.60	6.0
0.75	6.40	9.0
1.00	7.20	12.0
1.25	8.00	15.0
1.50	8.80	18.0
1.75	9.60	21.0
2.00	10.40	24.0
2.25	11.20	27.0
2.50	12.00	30.0
2.75	12.80	33.0
3.00	13.60	36.0
3.25	14.40	39.0
3.50	15.20	42.0

ERROR CODE DESCRIPTION FOR CONTROL BOARD

LED Blinks	Error Mode
2	Compressor 1 Safety
3	Compressor 2 Safety
4	Thermostat Failure
5	SAT Thermistor Failure
6	OAT Thermistor Failure
7	SPT Thermistor Failure
8	RAT Thermistor Failure
9	Loss of Communications with Expansion Board
10	Control Board Failure
11	Expansion I/O Board Failure

ERROR CODE DESCRIPTION FOR IGC CONTROL BOARD

LED Blinks	Error Mode
ON	Normal Operation
OFF	Hardware Failure
1	Fan On/Off Delay Modified
2	Limit Switch Fault
3	Flame Sense Fault
4	Four Consecutive Limit Switch Faults
5	Ignition Lockout Fault
6	Induced Draft Motor Fault
7	Rollout Switch Fault
8	Internal Control Fault

NOTE: When W1 is energized the burners will remain on for a minimum of 60 seconds. If more than one error mode exists they will be displayed on the LED in sequence.

BASE MODULE CONTROL BOARD DIP SWITCH ASSIGNMENTS

Setting	1	2	3	4	5	6	7	8
Open	VAV	VAV Space Sensor Installed	Expansion I/O Board	Field Test On	VAV Occupied Heat Enabled	Time Guard® Override On	Gas Heat	Heat Pump Operation
		CV, CCN or Sensors Used			CV Modulated Power Exhaust	In Conjunction with Field Test Set Minimum Damper Position On		
Closed	CV	VAV No Space Sensor	Base Control Board Only	Field Test Off	VAV Occupied Heat Disabled	Time Guard Override Off	Electric Heat	Standard A/C Operation
		CV Thermostat			CV Constant Volume Power Exhaust			

FACTORY SETTINGS OF MODULATING POWER EXHAUST SEQUENCERS

	Offset	DIFF	OFF Voltage	ON Voltage	OFF Static	ON Static
Stage 1 (PES1)	50%	3%	6.0	6.3	0.00	0.04
Stage 2 (PES2)	55%	3%	6.5	6.8	0.06	0.10
Stage 3 (PES3)	60%	3%	7.0	7.3	0.13	0.16
Stage 4 (PES4)	65%	3%	7.5	7.8	0.19	0.23
Stage 5 (PES5)	70%	3%	8.0	8.3	0.25	0.29
Stage 6 (PES6)	75%	3%	8.5	8.8	0.31	0.35

Fig. 15 — Component Arrangement — 48/50EJ,EK,EW,EY054-068 Units

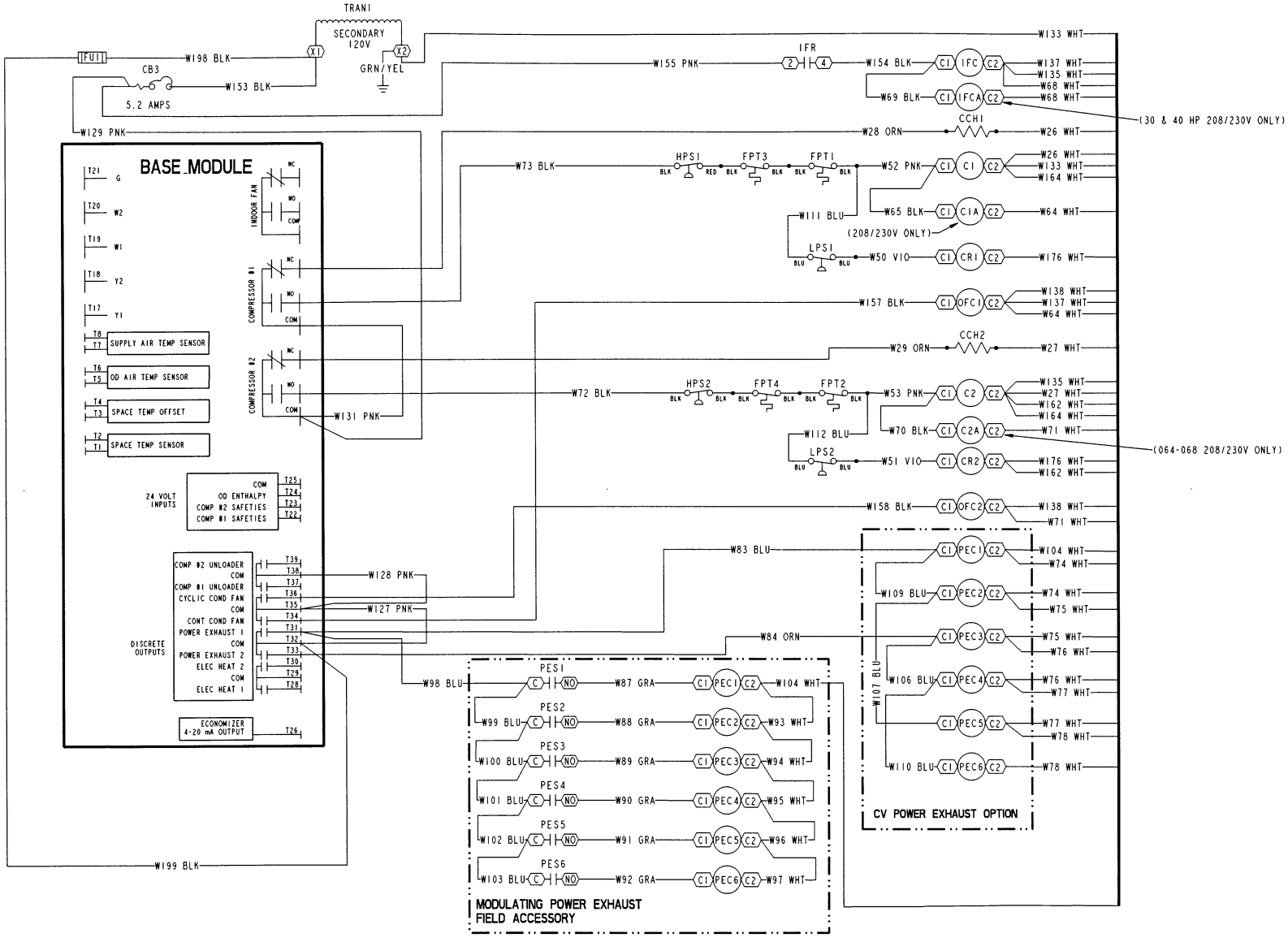


Fig. 16 — Control Circuit (120-V) — 48/50EJ,EW054-068 Units

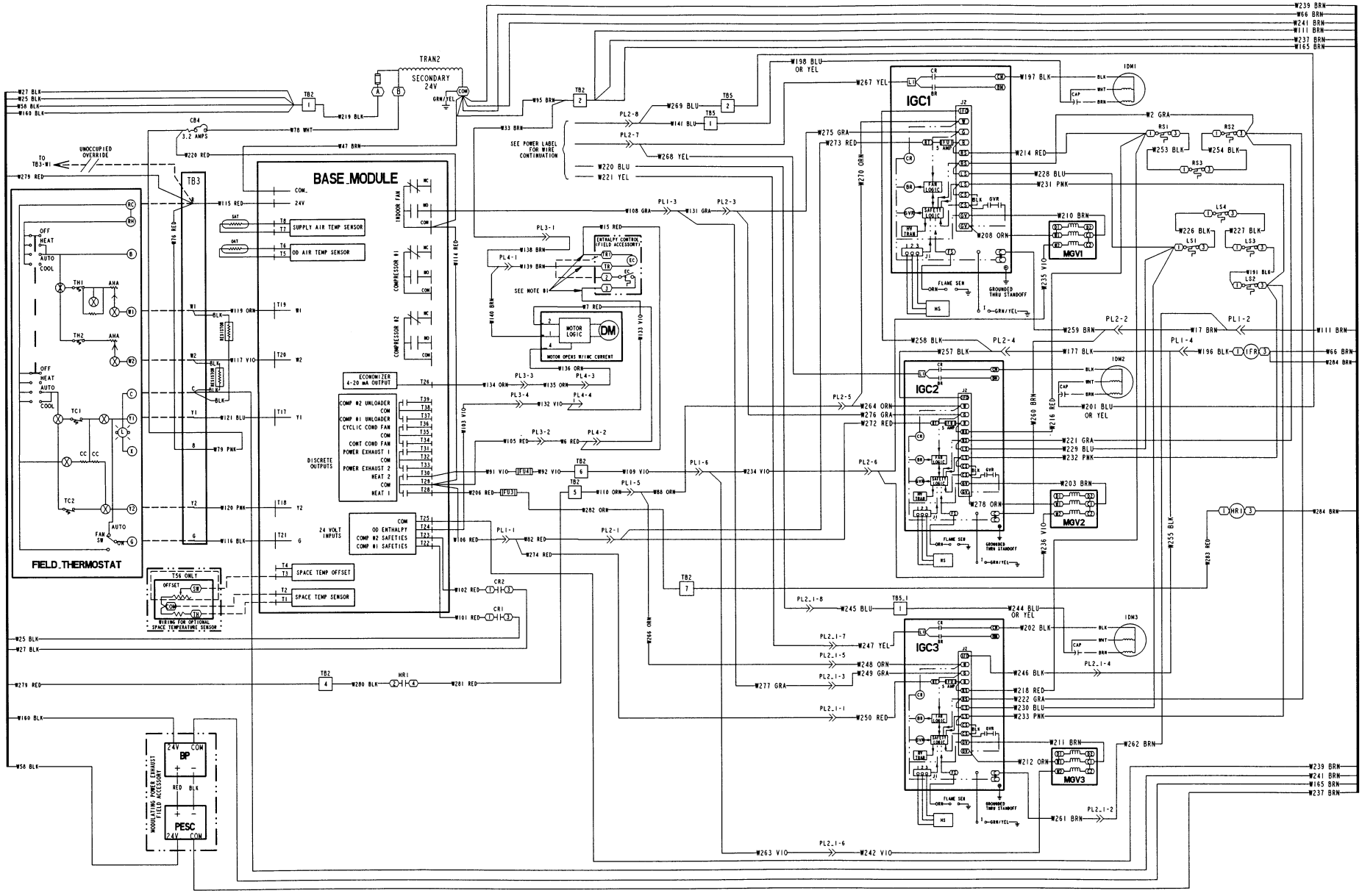


Fig. 17 — Control Circuit (24-V) — 48EJ,EW054-068 Units

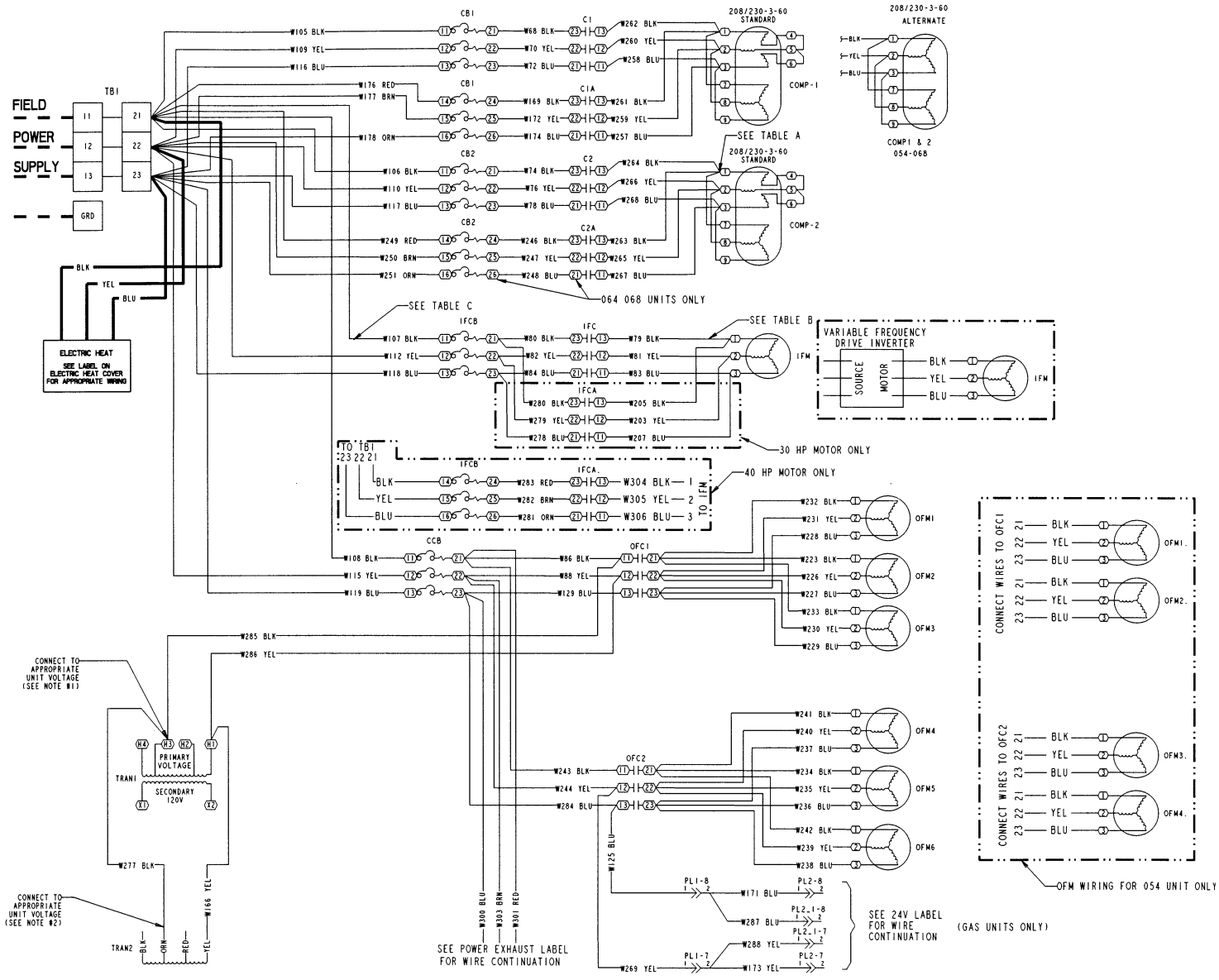


TABLE A

The Following Compressors Have Two Parallel Wires Run from TB1 to the Compressors

Compressor Model	Voltage	Wire Quantity
06E-250	208/230-3-60	2

TABLE B

The Following Fan Motors Have Two Parallel Wires Run from TB1 to the Fan Motors (Not Shown on Label Diagram)

Indoor Motor	Voltage	Wire Quantity
20 Hp	208/230-3-60	2
25 Hp	208/230-3-60	2

TABLE C

The Following Fan Motors Have Two Parallel Wires Run from TB1 to IFCB (Not Shown on Label Diagram)

Indoor Motor	Voltage	Wire Quantity
30 Hp	208/230-3-60	2

Fig. 18 — Power Schematic — 48/50EJ,EK,EW,EY054-068; 208/230-3-60 Units

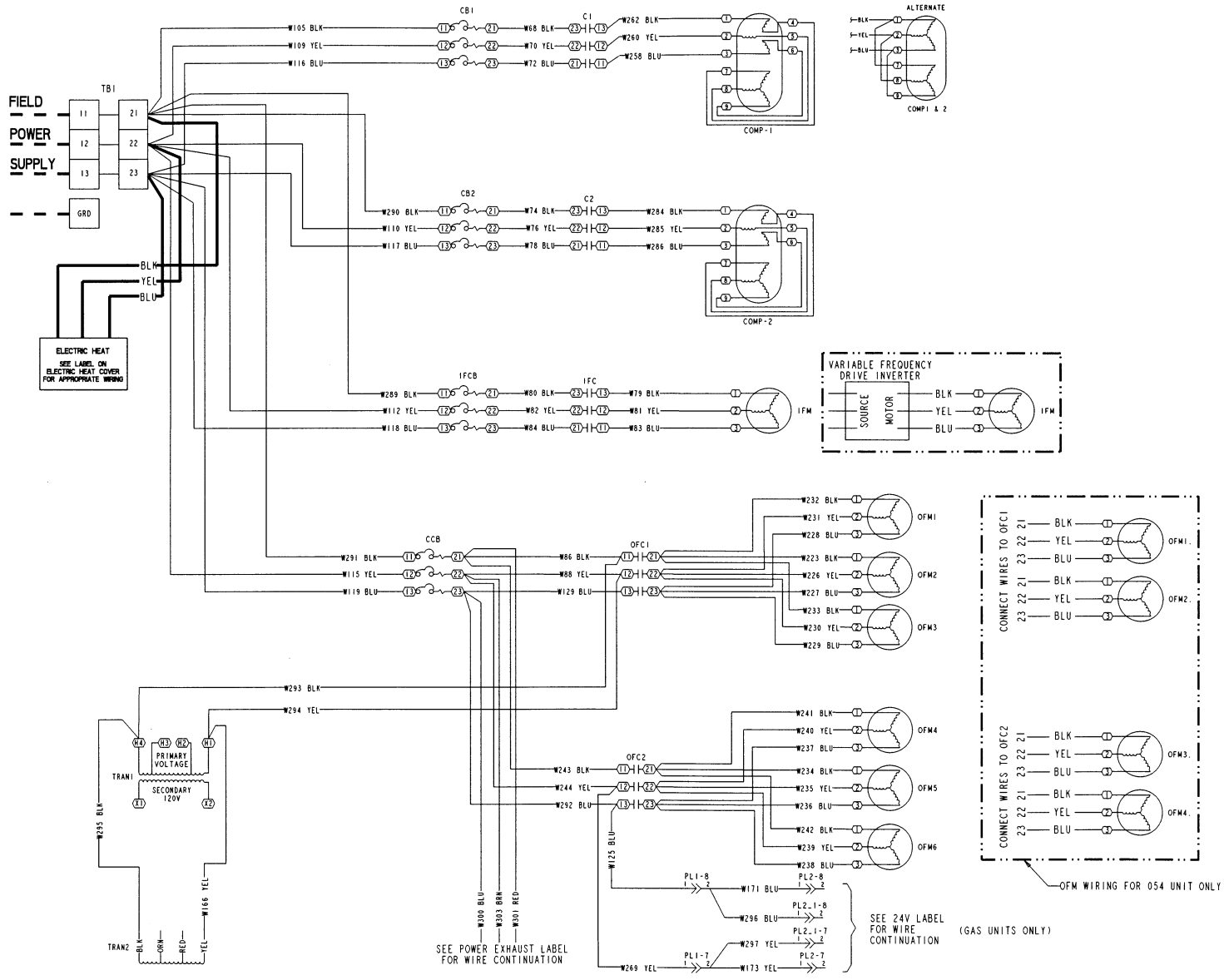


Fig. 19 — Power Schematic — 48/50EJ,EK,EW,EY054-068; 460-3-60 Units

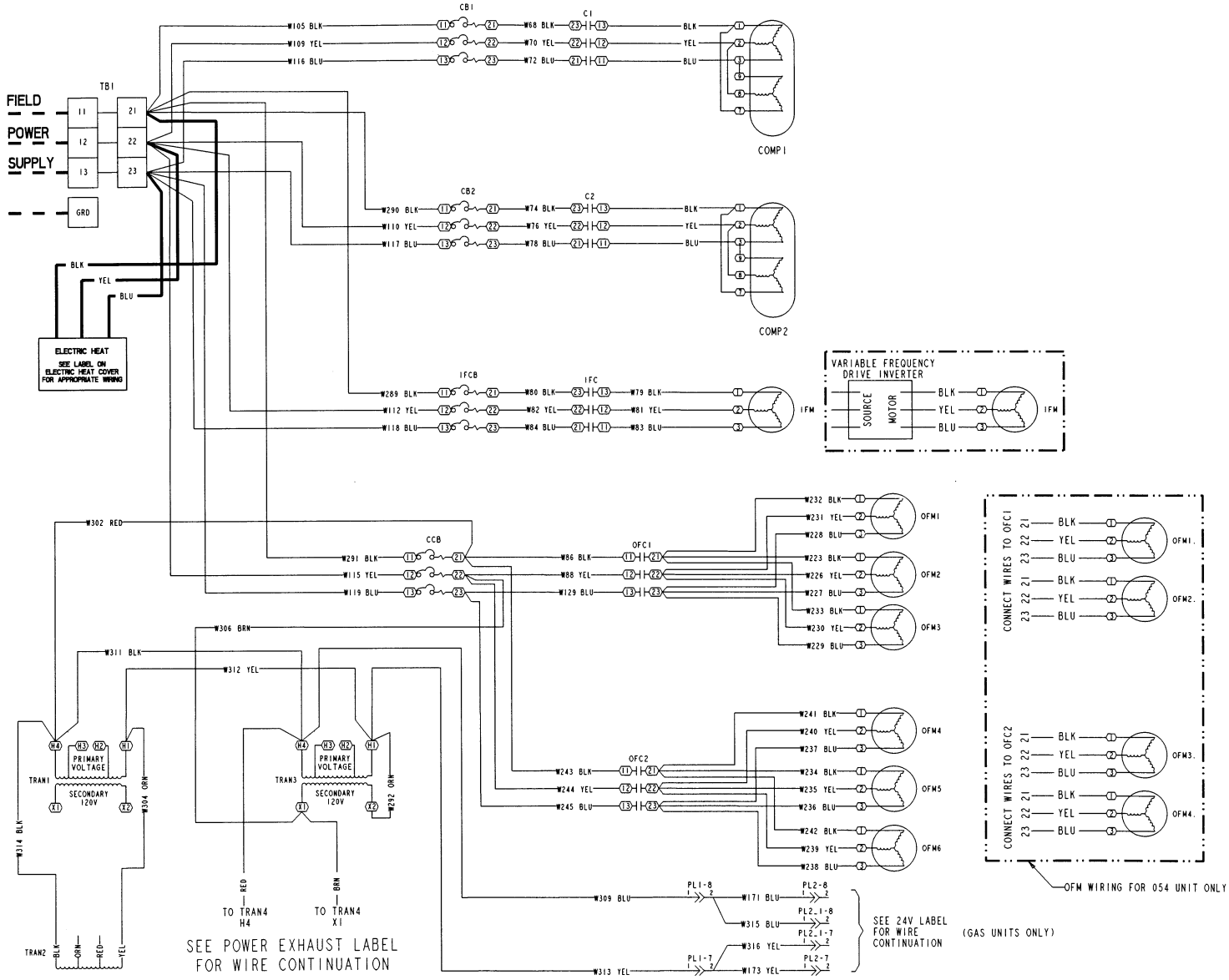


Fig. 20 — Power Schematic — 48/50EJ,EK,EW,EY054-068; 575-3-60 Units

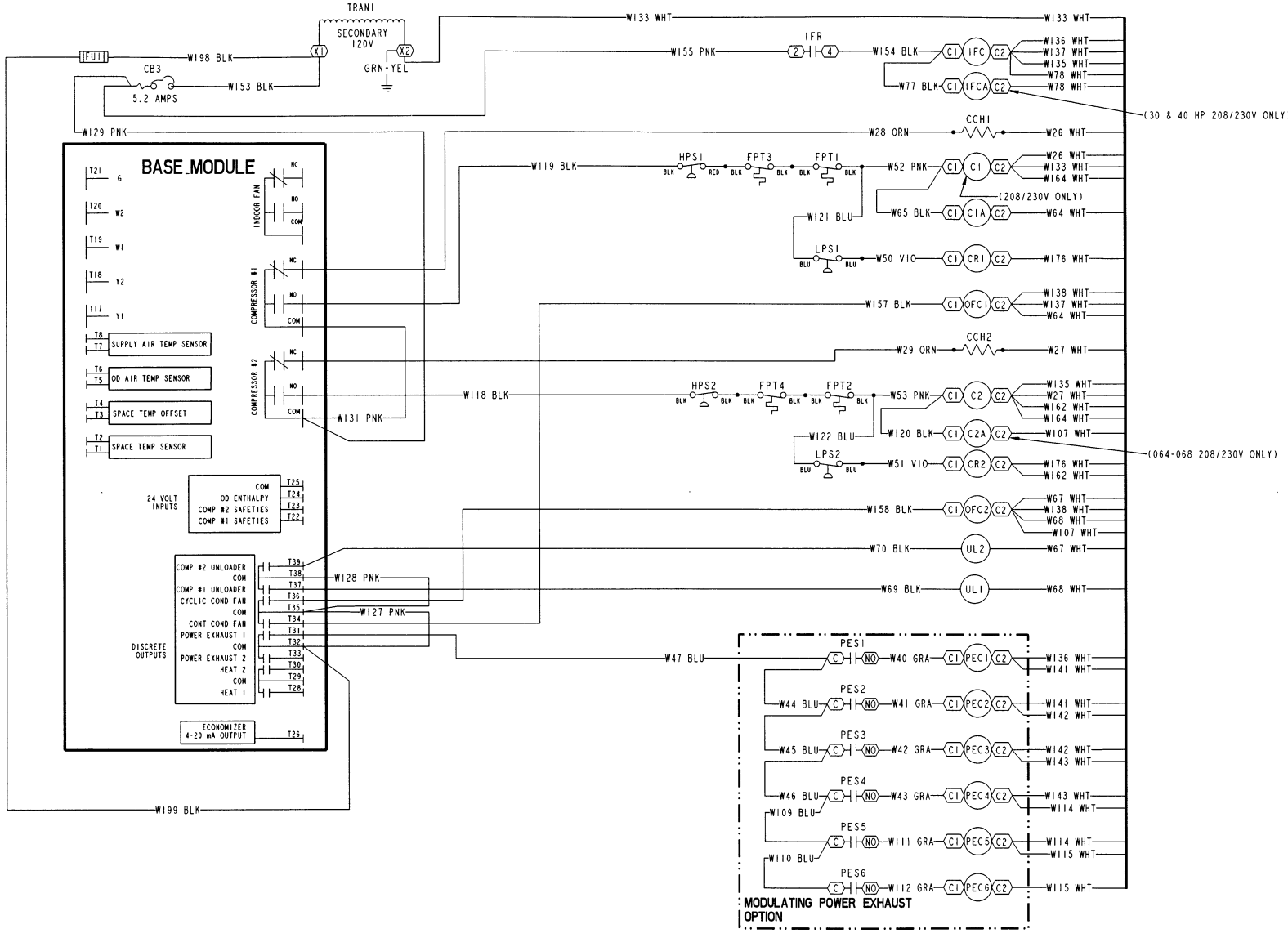


Fig. 21 — Control Circuit (120-V) — 48/50EK,EY054-068 Units

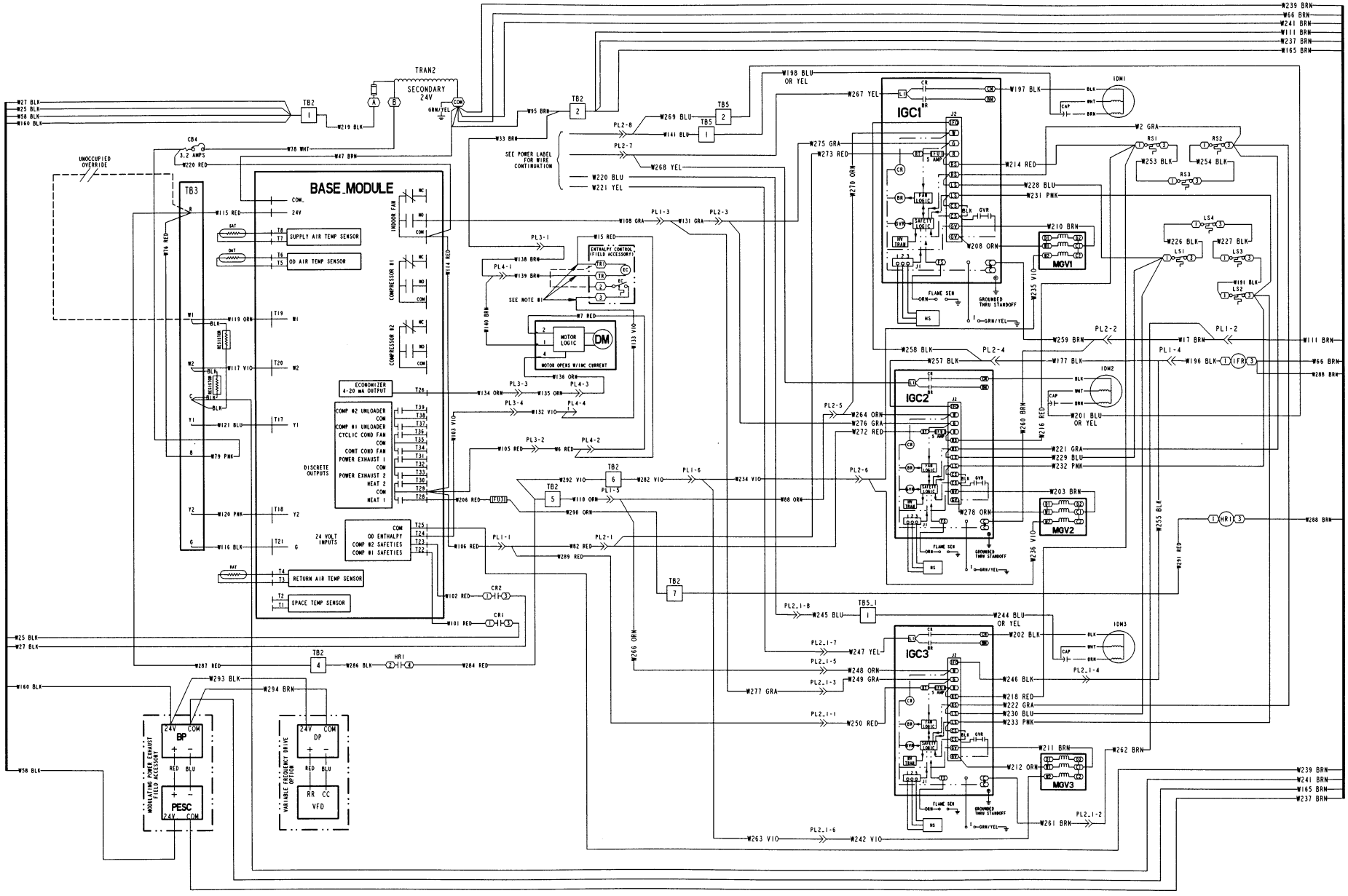


Fig. 22 — Control Circuit (24-V) — 48EK,EY054-068 Units

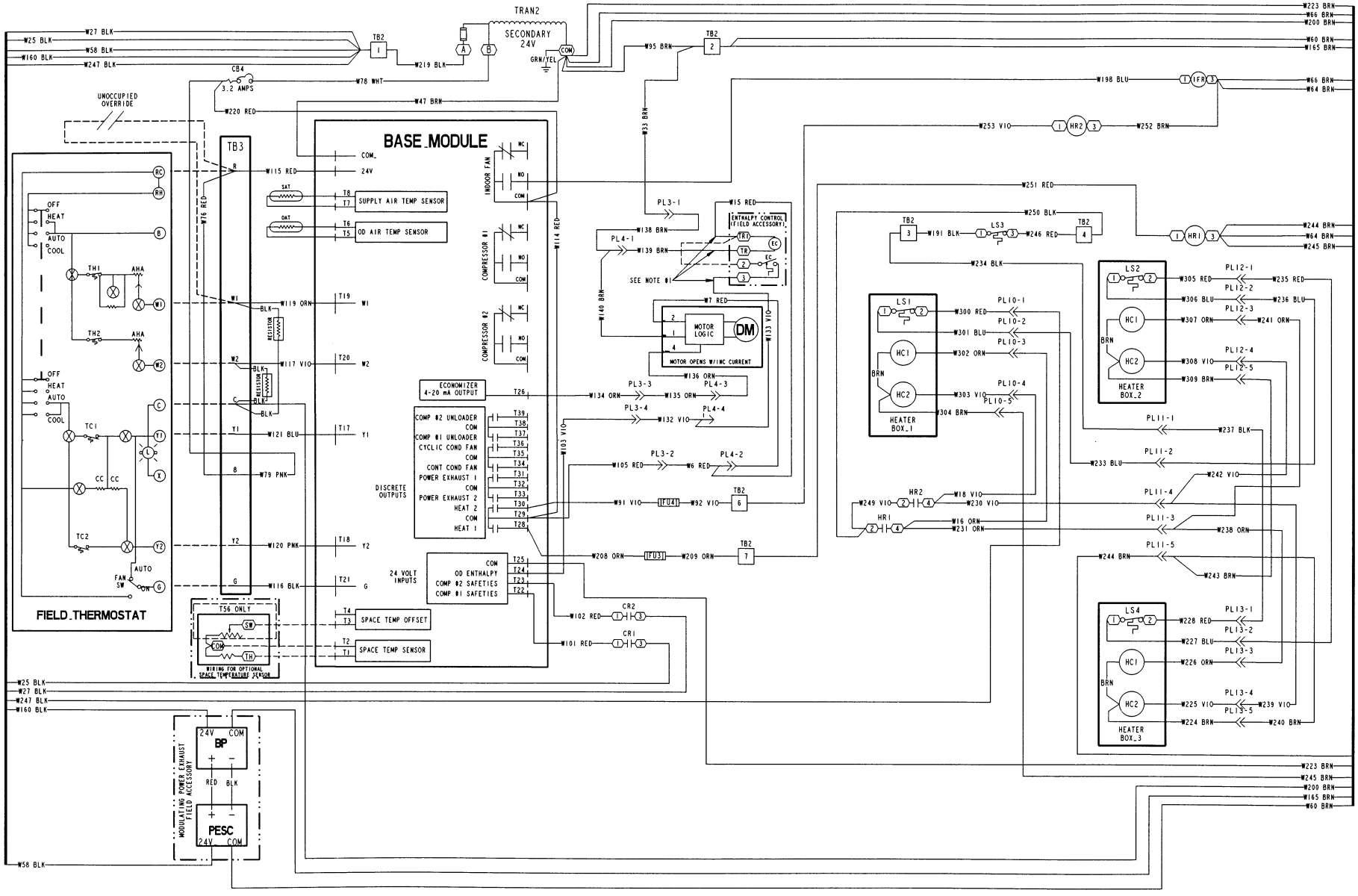


Fig. 23 — Control Circuit (24-V) — 50EJ,EW054-068 Units

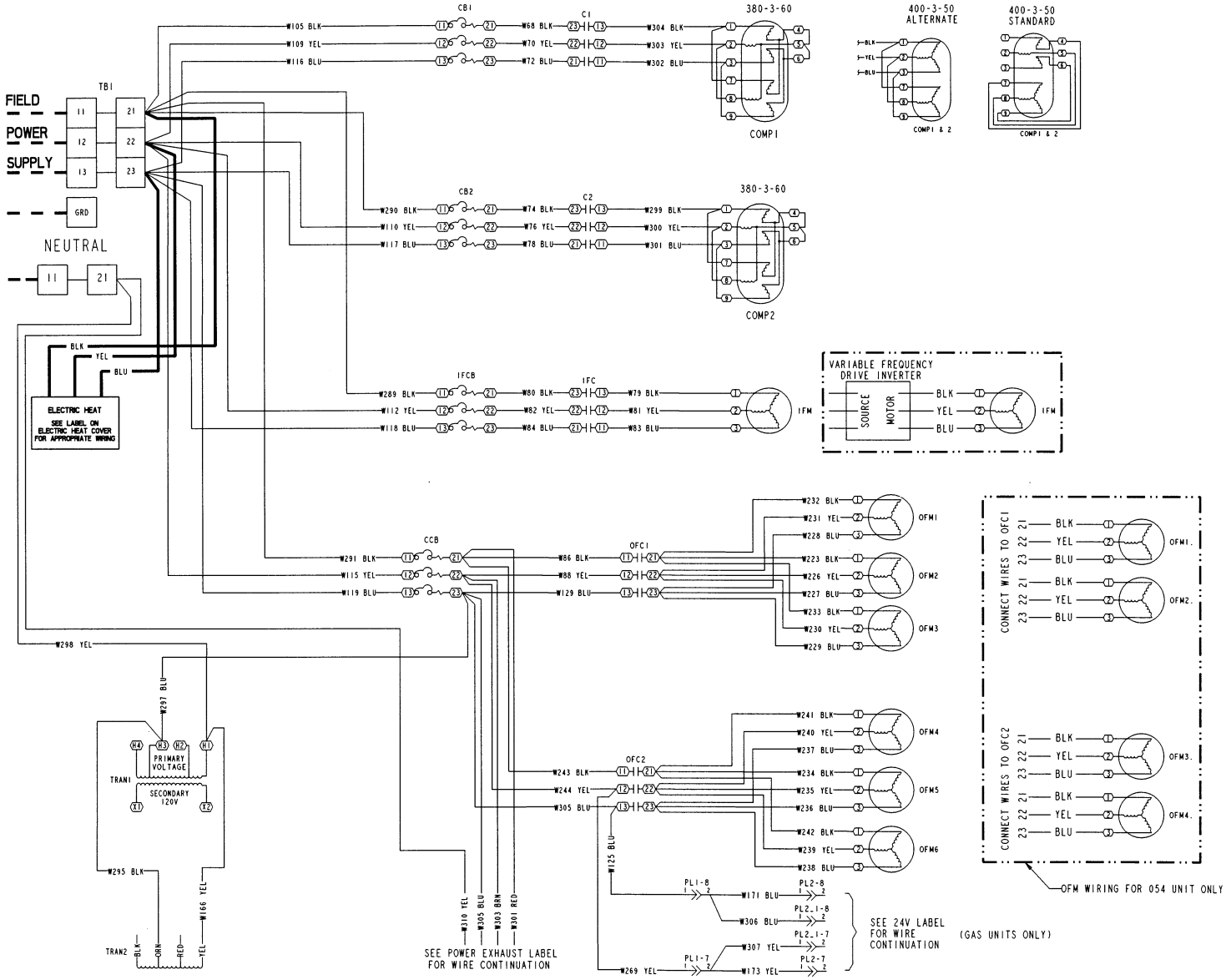


Fig. 24 — Power Schematic — 50EJ,EK,EW,EY054-068; 380-3-60 and 400-3-50 Units

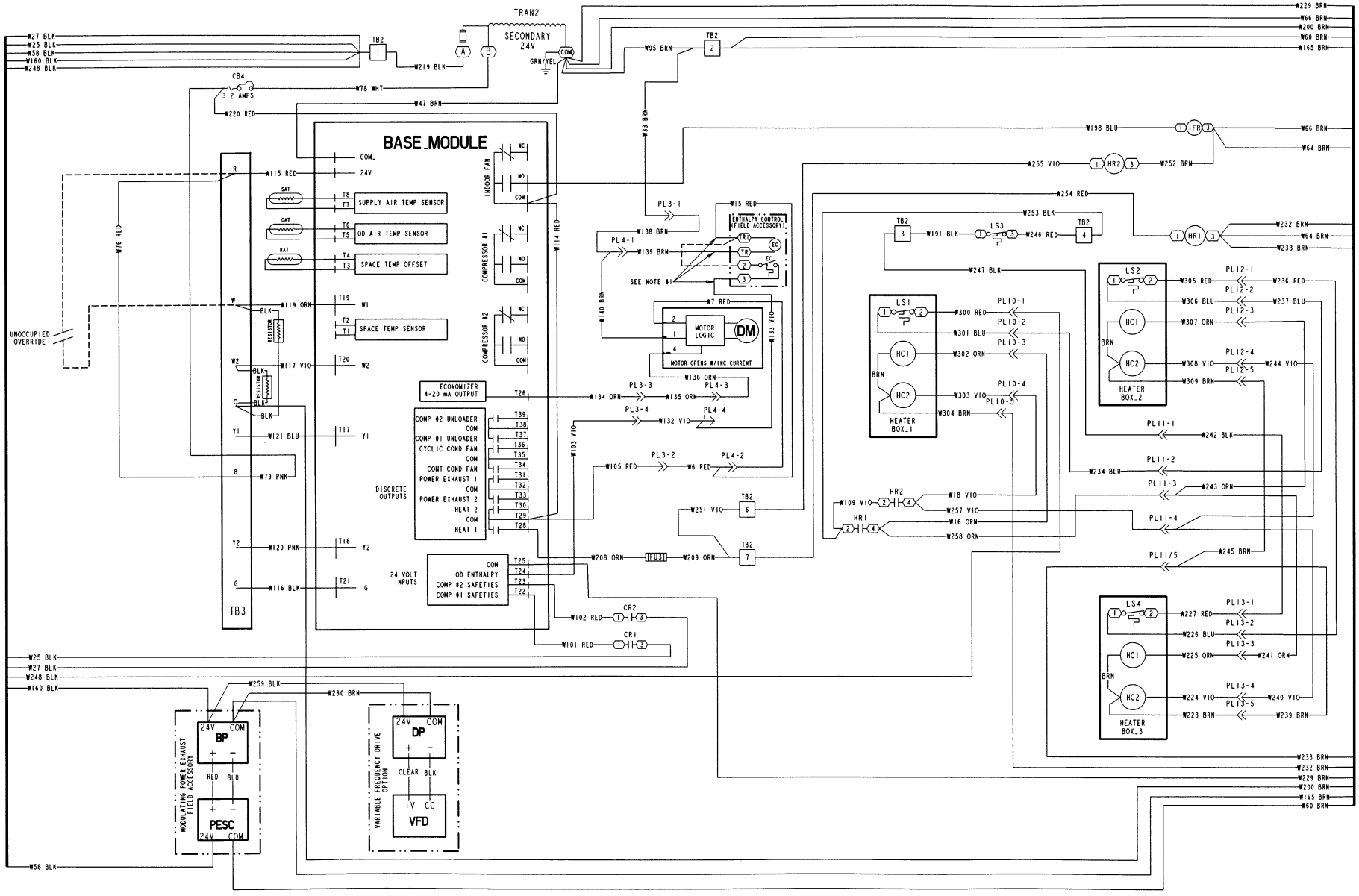


Fig. 25 — Control Circuit (24-V) — 50EK,EY054-068 Units

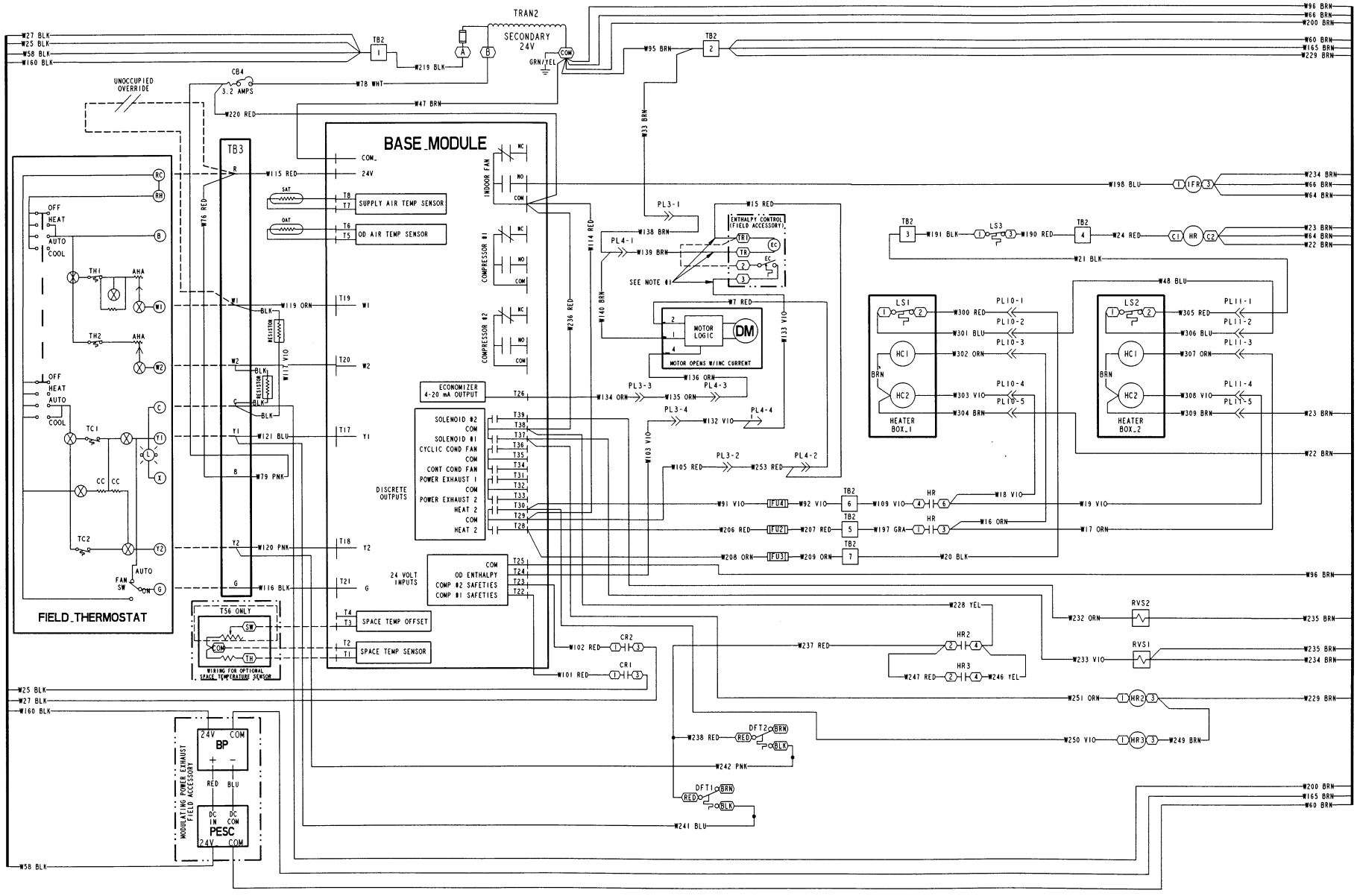


Fig. 26 — Control Circuit — 50EJQ,EWQ024,028 Units

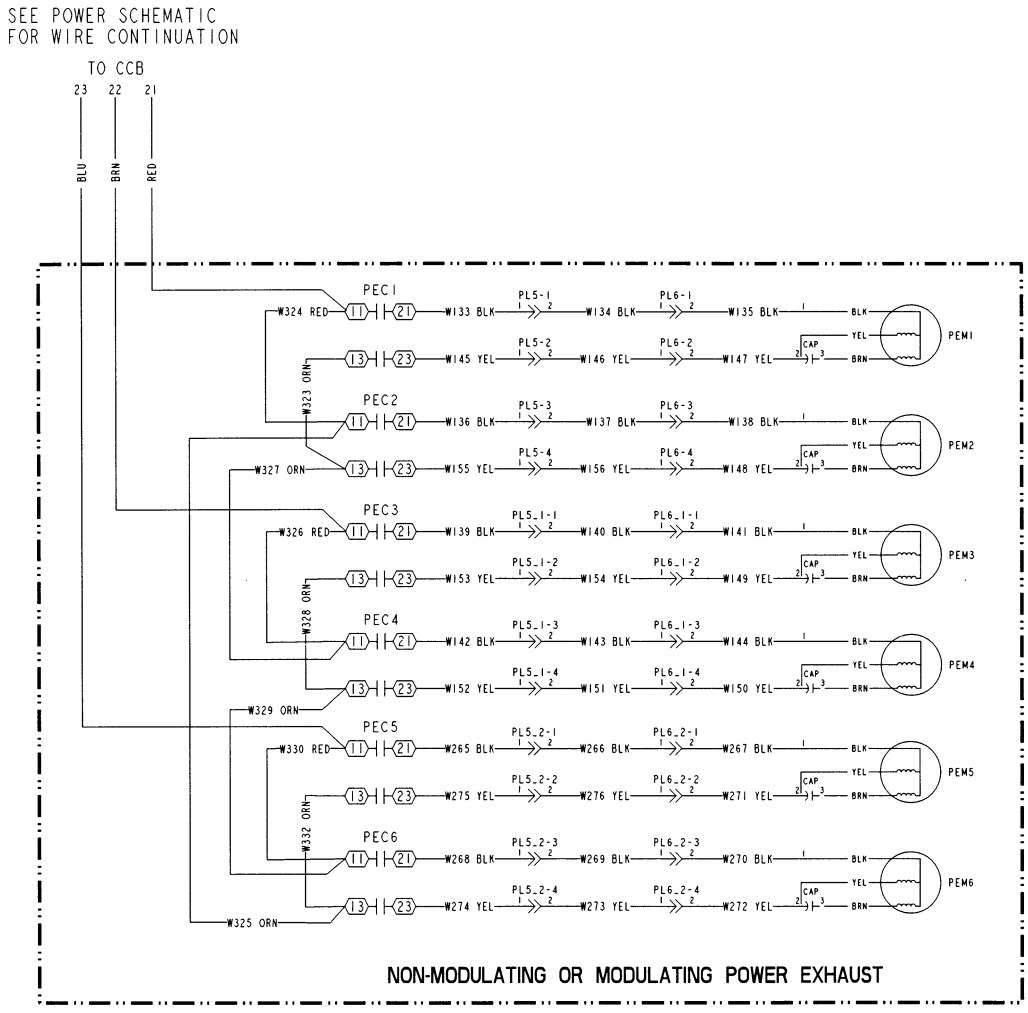


Fig. 27 — Power Exhaust — 48/50EJ,EK,EW,EY054-068; 208/230-3-60 and 460-3-60 Units

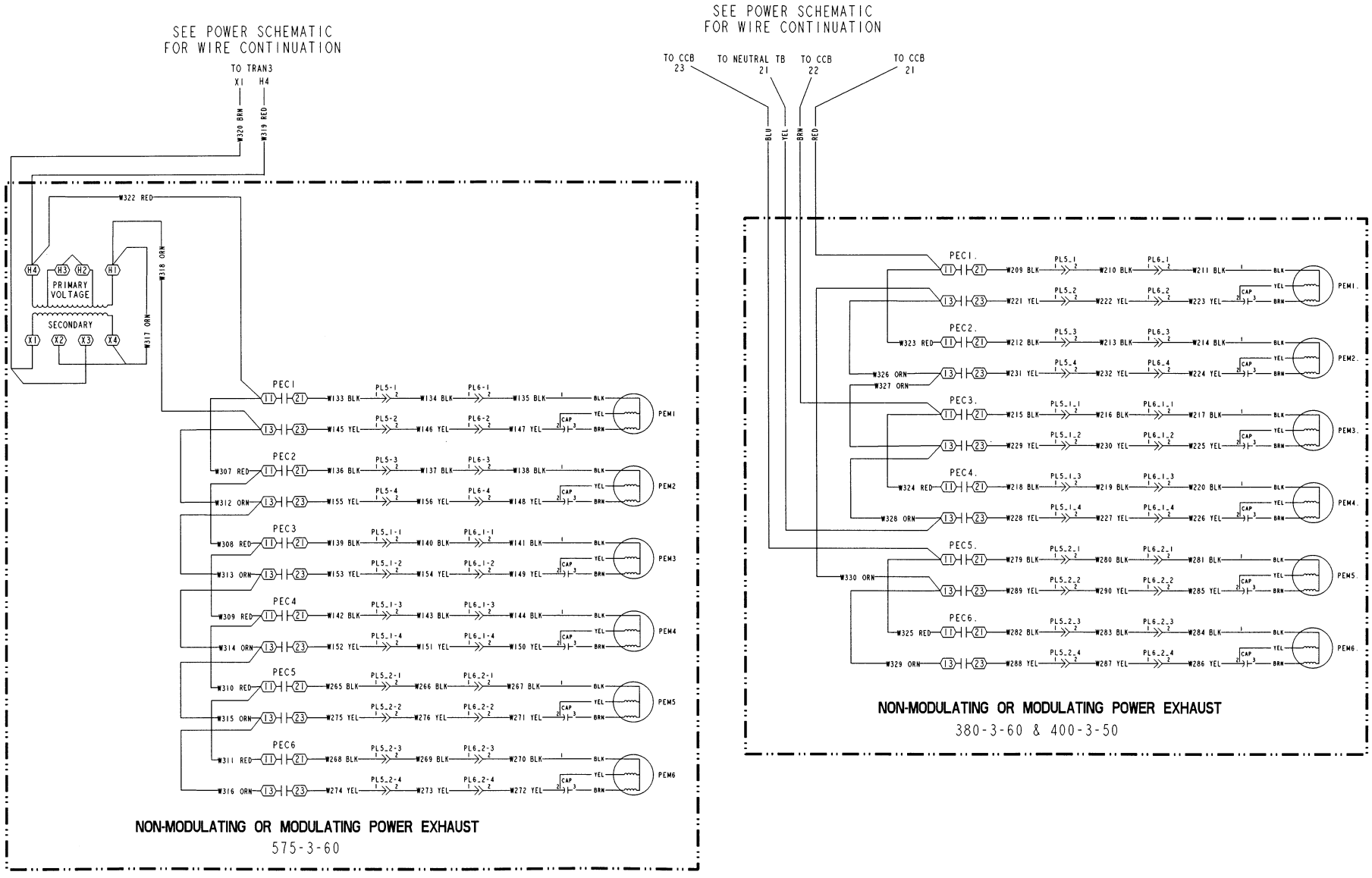
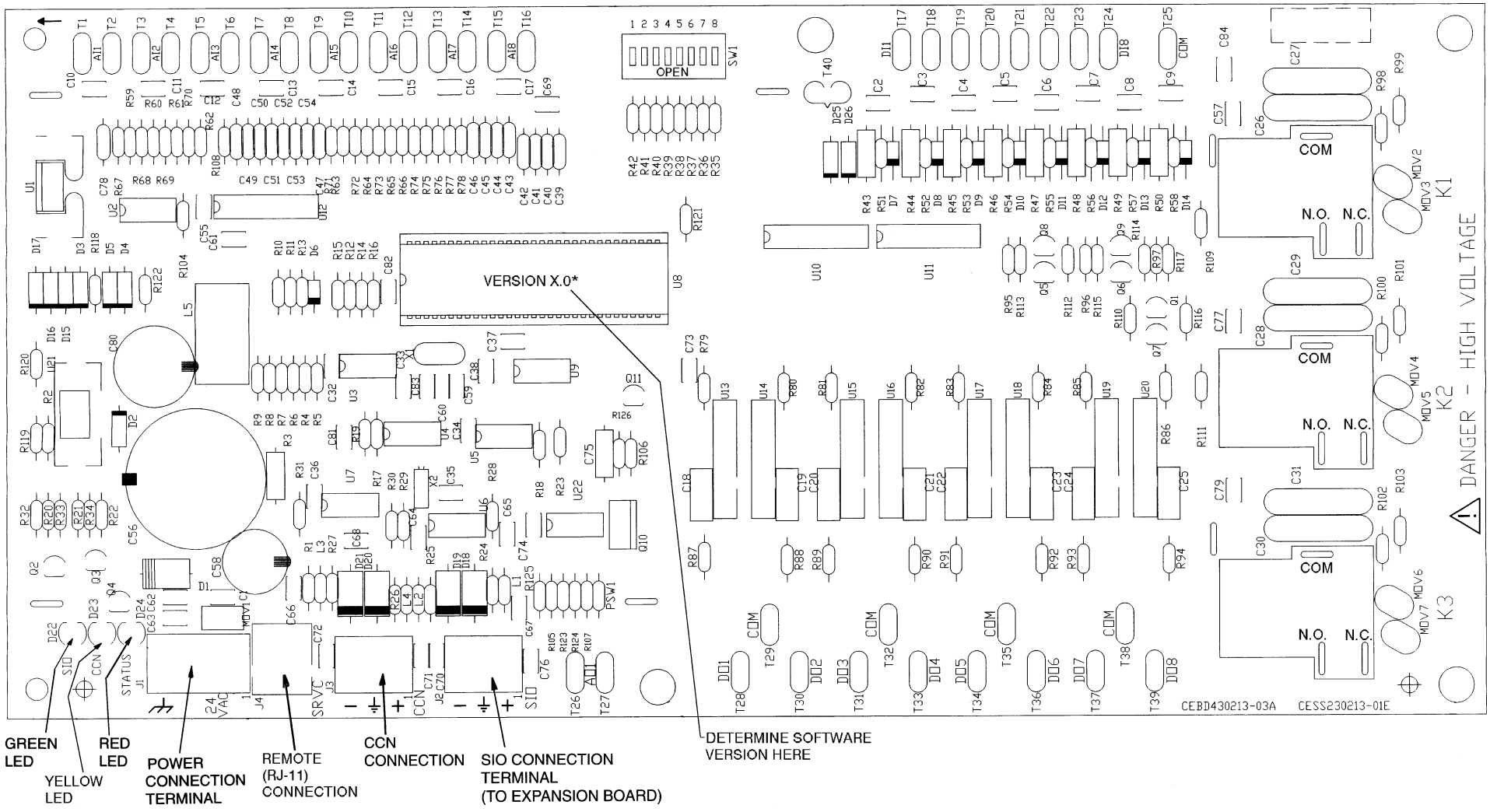


Fig. 28 — Power Exhaust — 48/50EJ,EK,EW,EY054-068; 575-3-60 Units and 50EJ,EK,EW,EY054-068; 380-3-60 and 400-3-50 Units



*Where X is the unit control software version number (1 or 2).

Fig. 29 — Base Unit Control Board Diagram

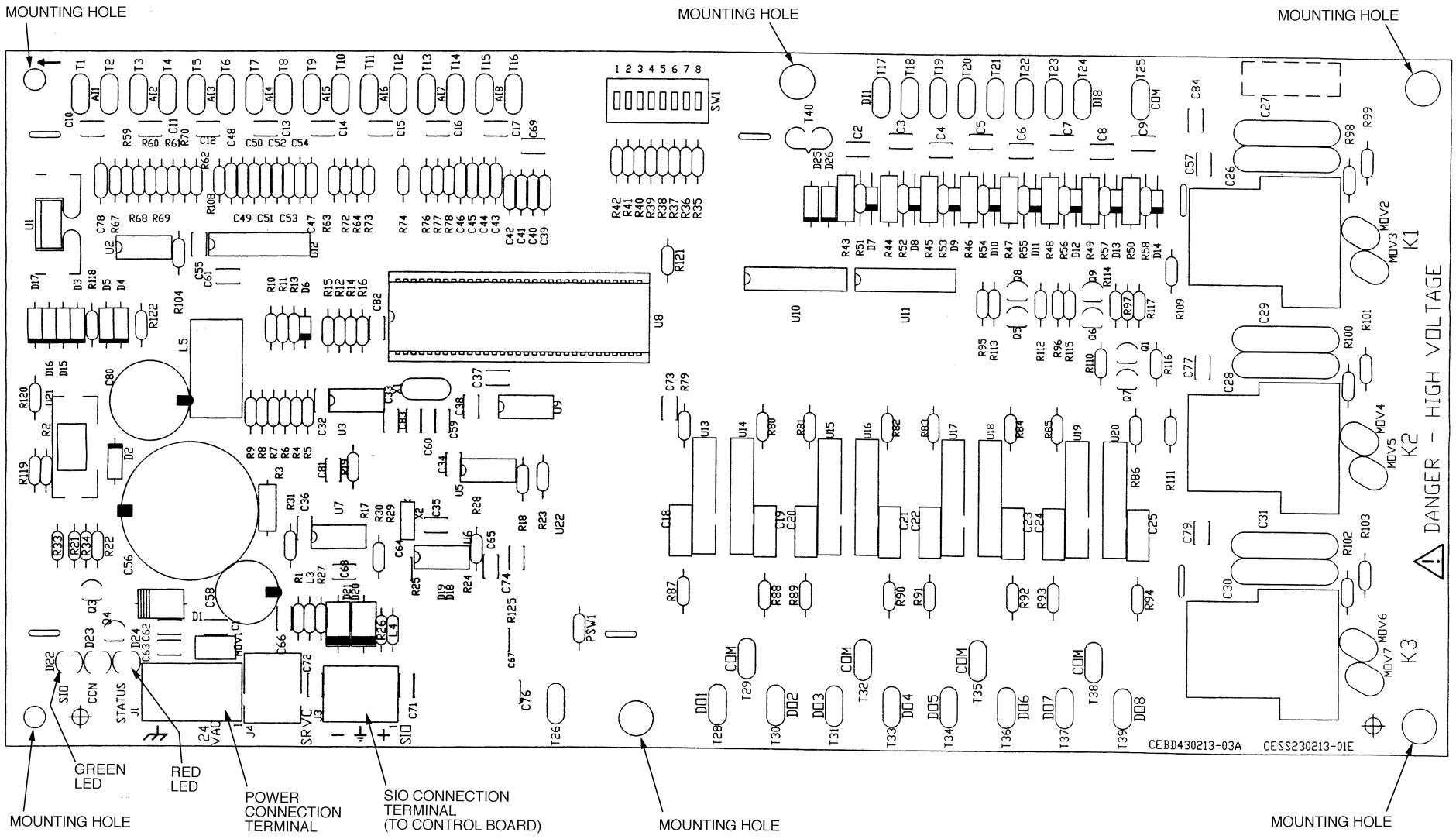
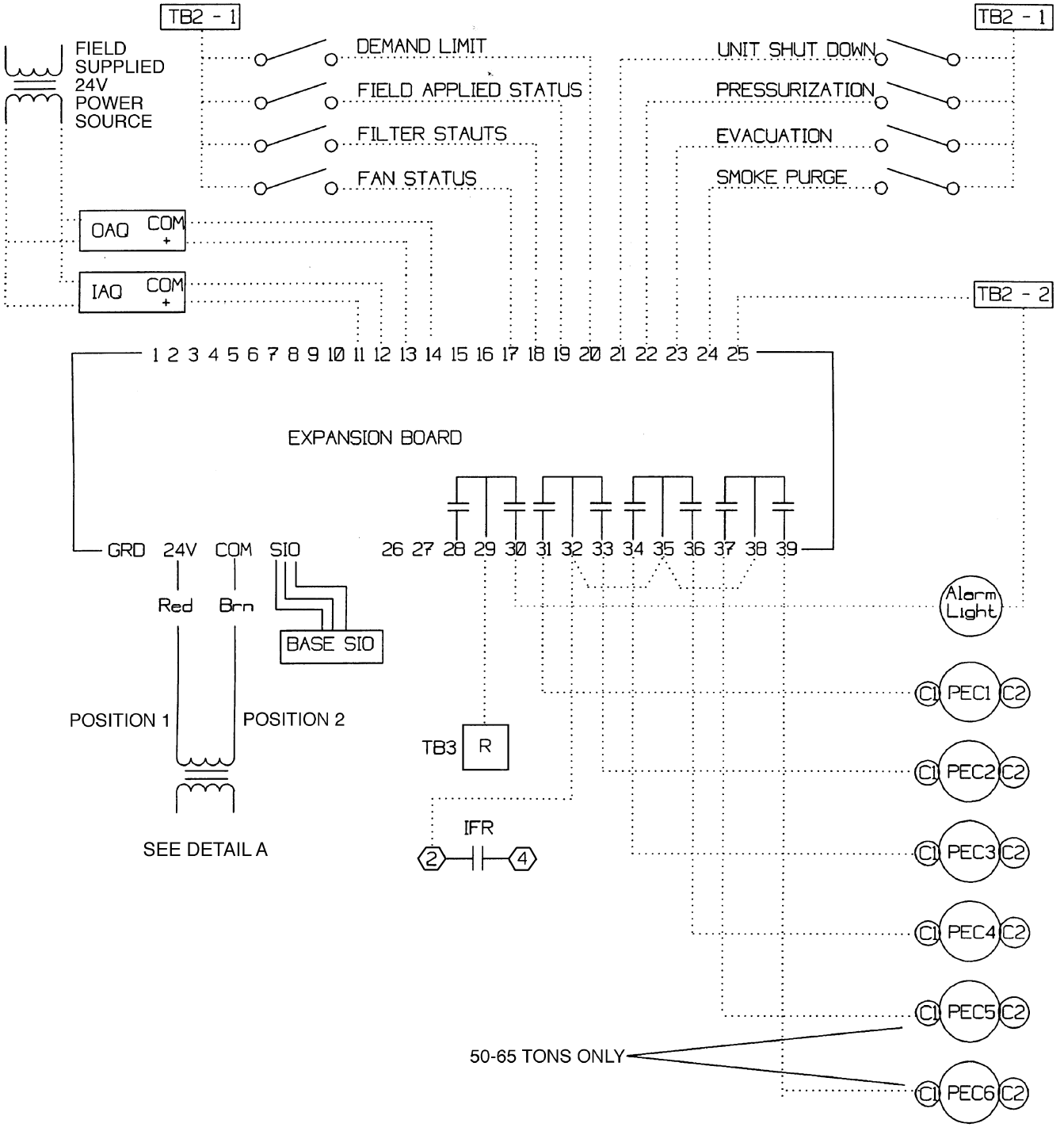


Fig. 30 — Expansion Board Connections



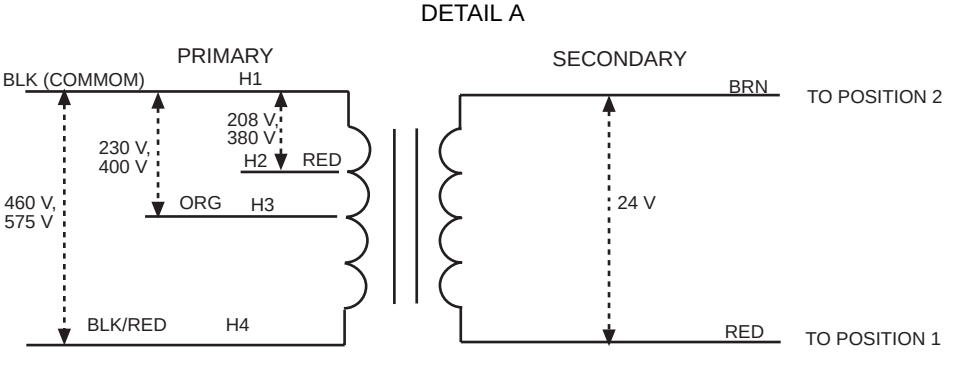
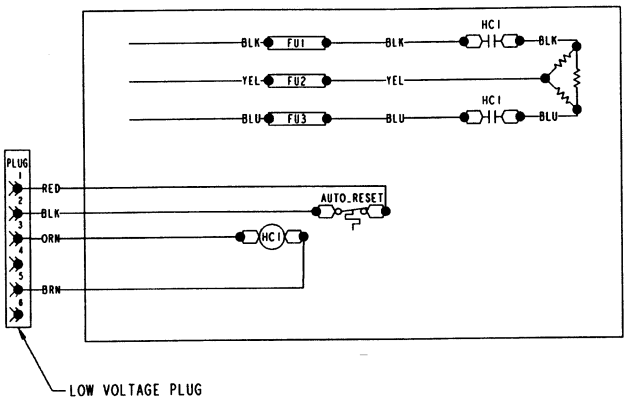
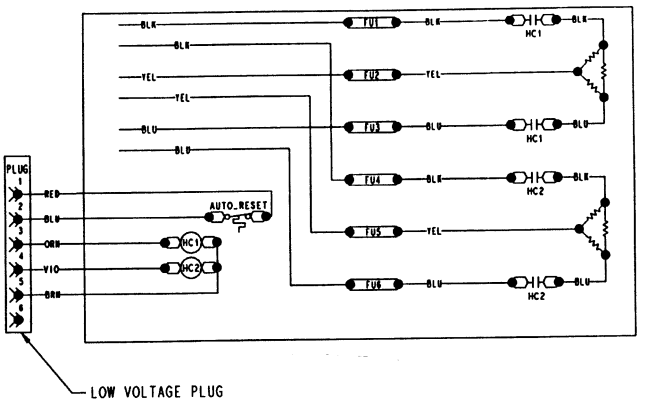


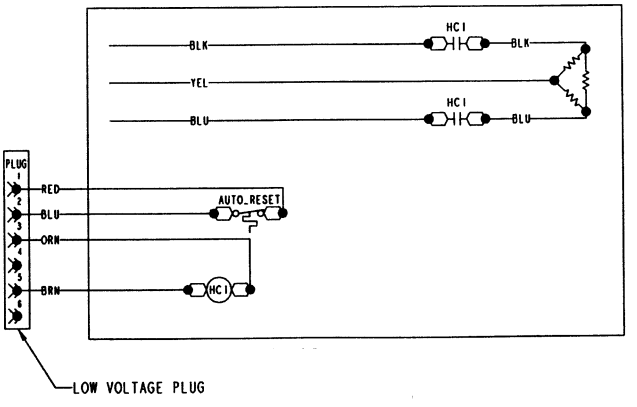
Fig. 31 — Expansion Board Wiring



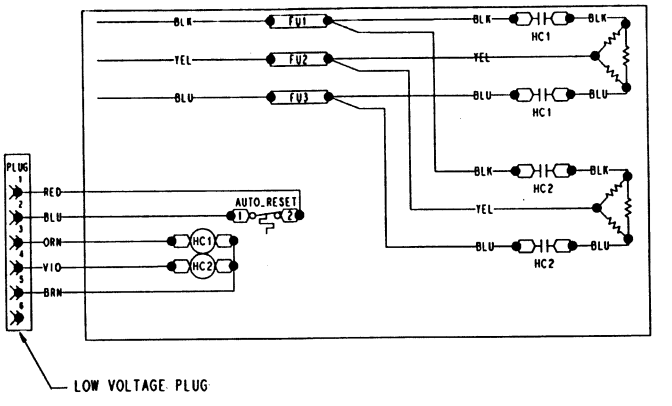
CRHEATER124A00
(240 V, 18 kW*)



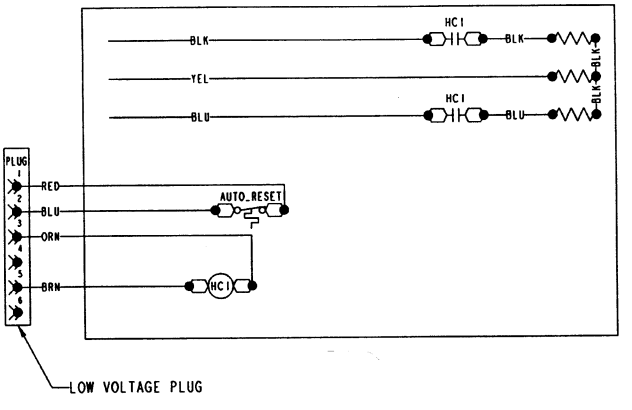
CRHEATER125A00
(240 V, 36 kW†)



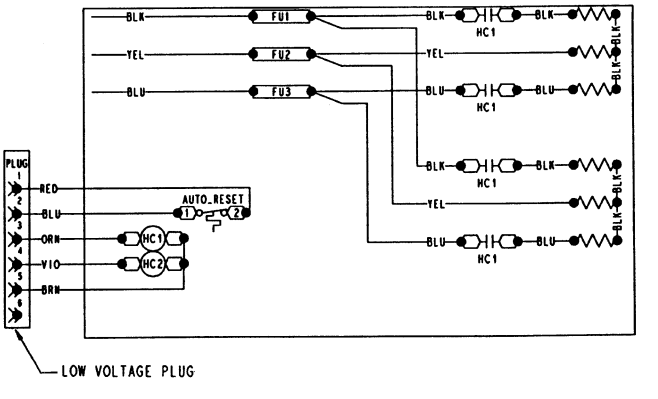
CRHEATER126A00
(380 V, 400 V, AND 480 V, 18 kW*)



CRHEATER127A00
(380 V, 400 V, AND 480 V, 36 kW†)



CRHEATER128A00
(600 V, 18 kW*)



CRHEATER129A00
(6000 V, 36 kW†)

*Two heater assemblies total 36 kW.

†Two heater assemblies total 72 kW.

Fig. 32 — Accessory Heat Package Wiring Schematic

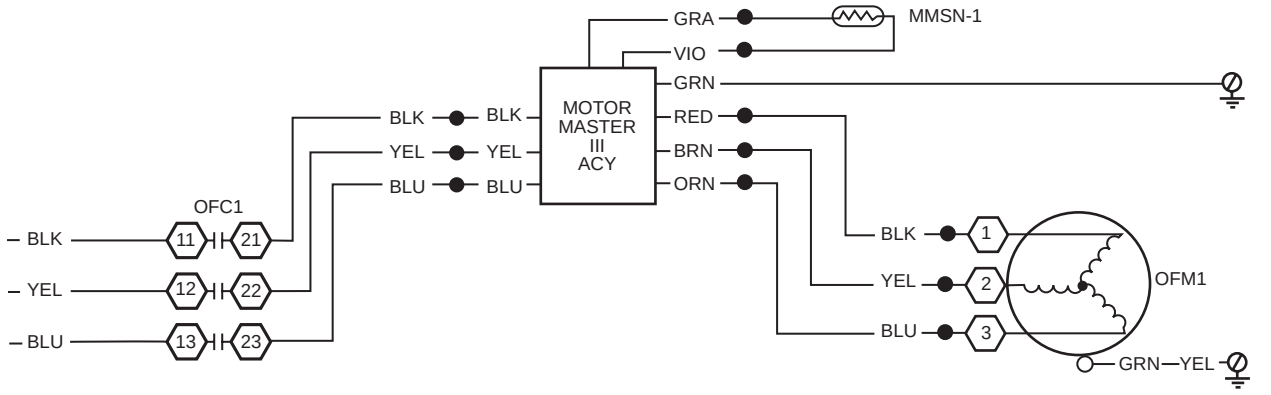


Fig. 33 — Motormaster® III Device Wiring, 48/50EJ,EK,EW,EY024-034 — All Units Except 575-v Units

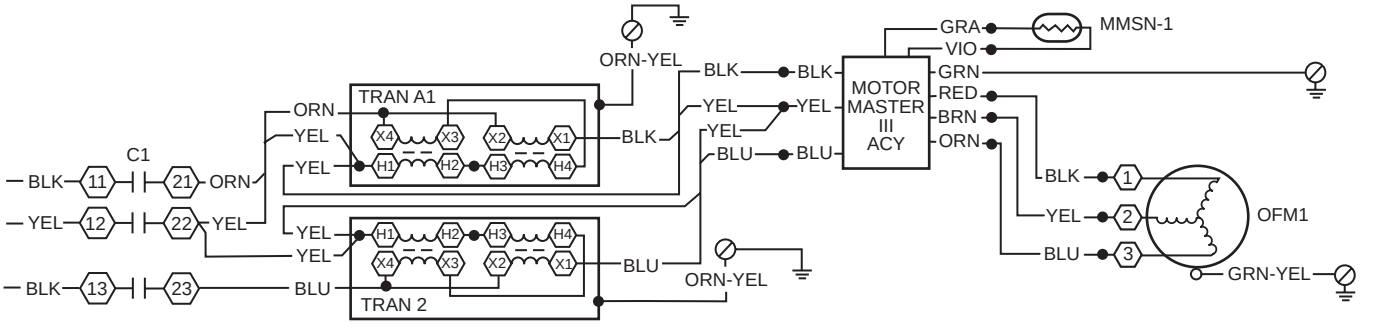
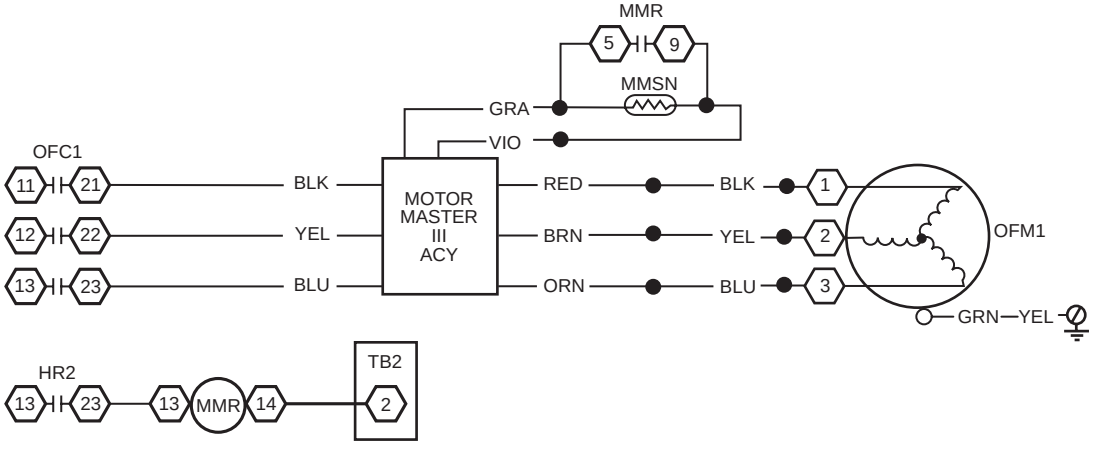


Fig. 34 — Motormaster III Device Wiring, 48/50EJ,EK,EW,EY024-034 — 575-3-60 Units



NOTE: Motormaster Relay part no. is HN61KZ024 with HY07RB030 socket.

Fig. 35 — Motormaster III Device Wiring, 50EJQ,EWQ024 and 028

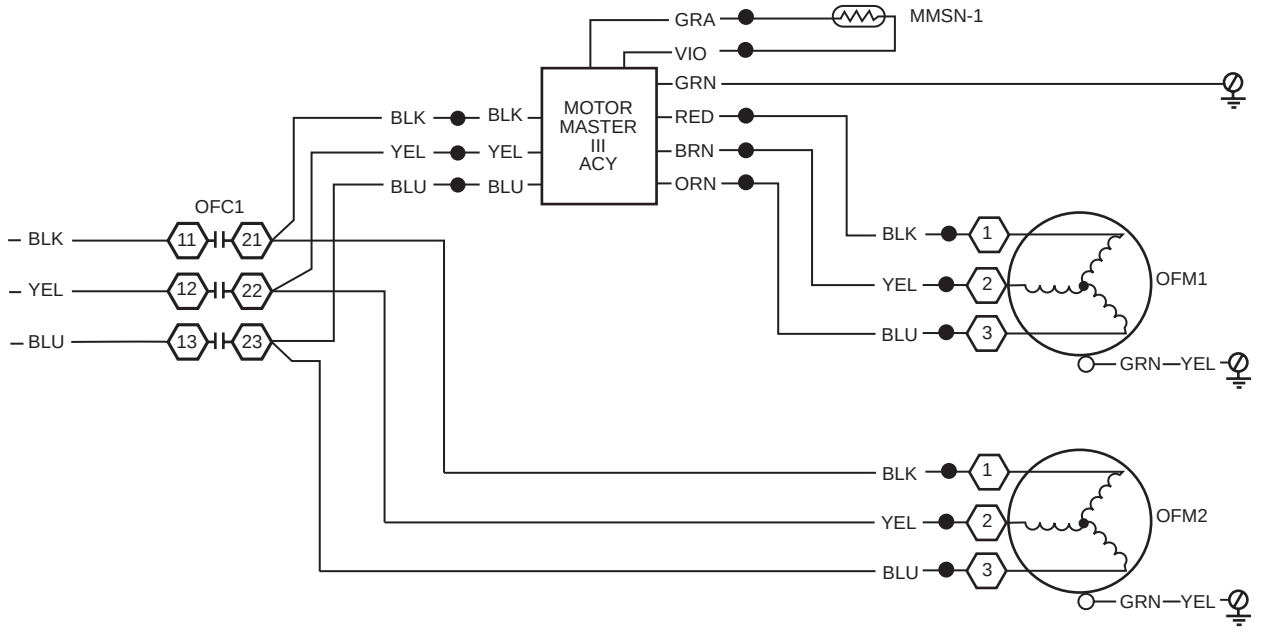


Fig. 36 — Motormaster® III Device Wiring, 48/50EJ,EK,EW,EY038-068 — All Units Except 575-V Units

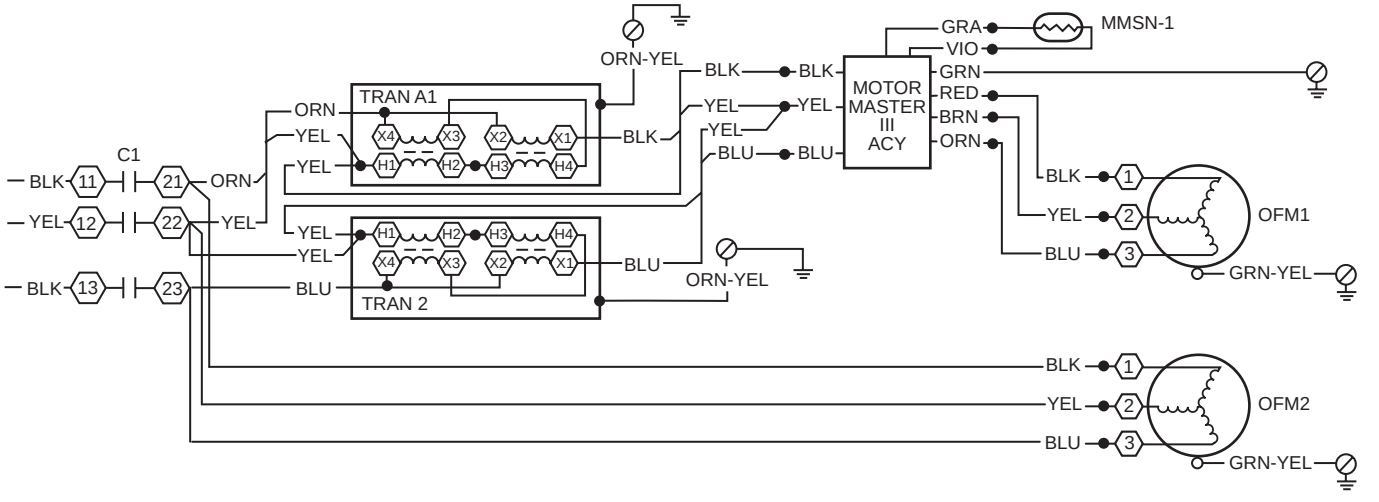


Fig. 37 — Motormaster III Device Wiring, 48/50EJ,EK,EW,EY038-068 — 575-3-60 Units

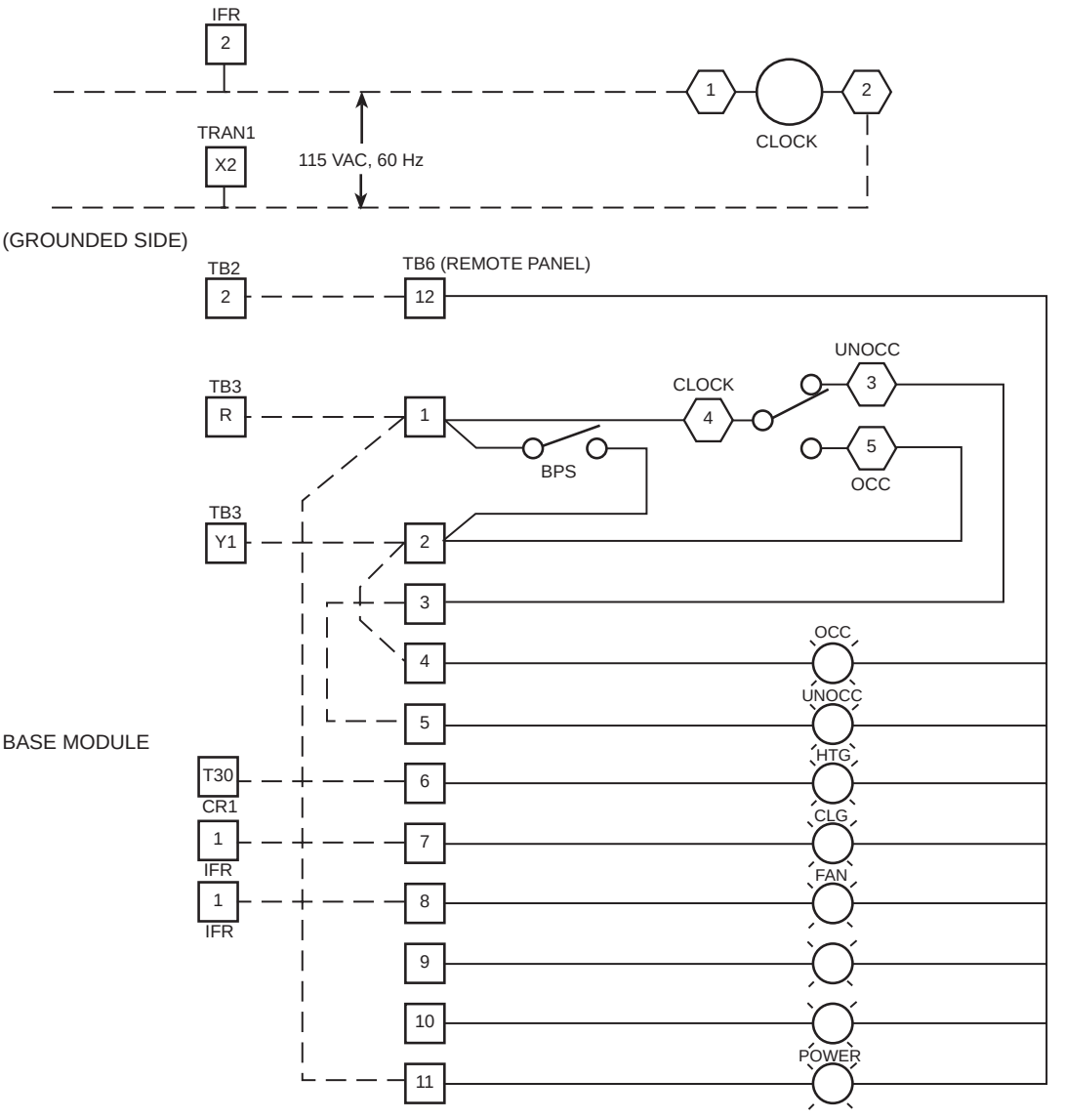


Fig. 38 — Remote Control Panel Wiring (Part No. 50DD-900-081)

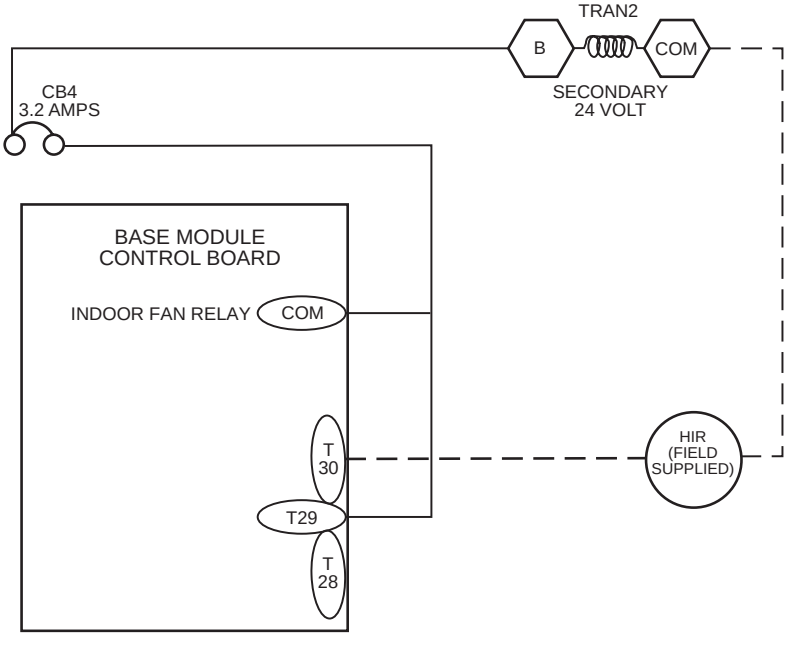


Fig. 39 — Heat Interlock Relay Wiring (Part No. HN61KK040)

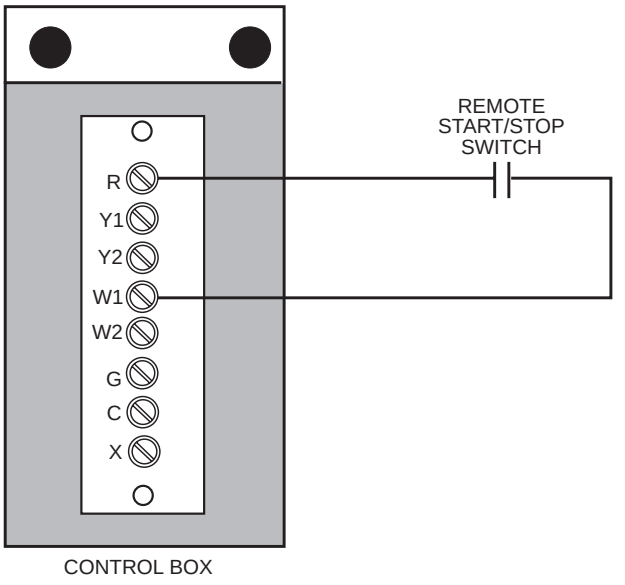
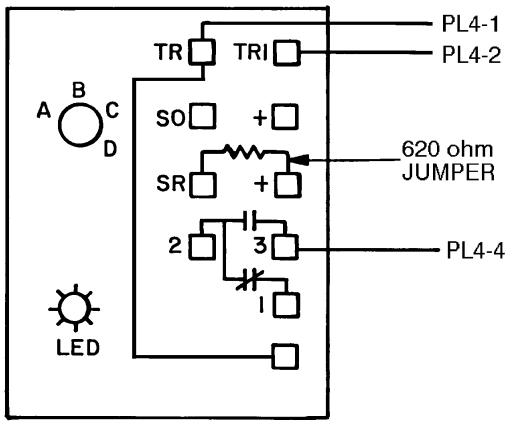


Fig. 40 — Field Control Remote Start/Stop Wiring



NOTE: Switches shown in high enthalpy state. Terminals 2 and 3 close on enthalpy decrease.

Fig. 41 — Wiring Connections for Solid-State Enthalpy Control (HH57AC077)

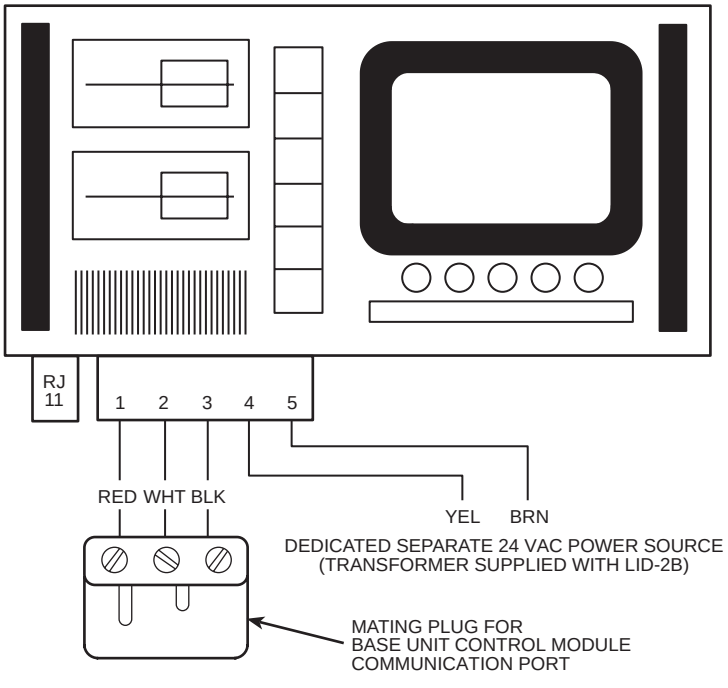
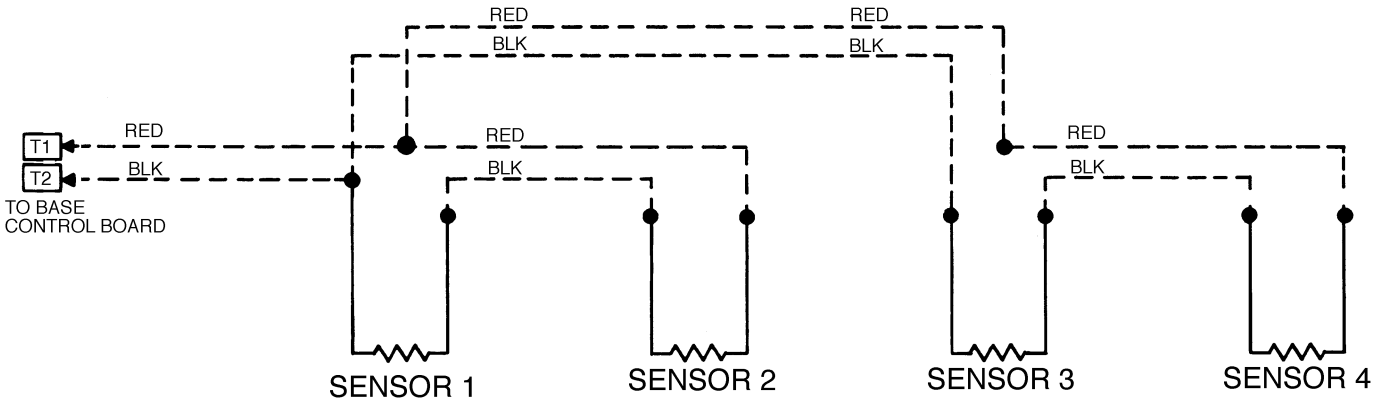
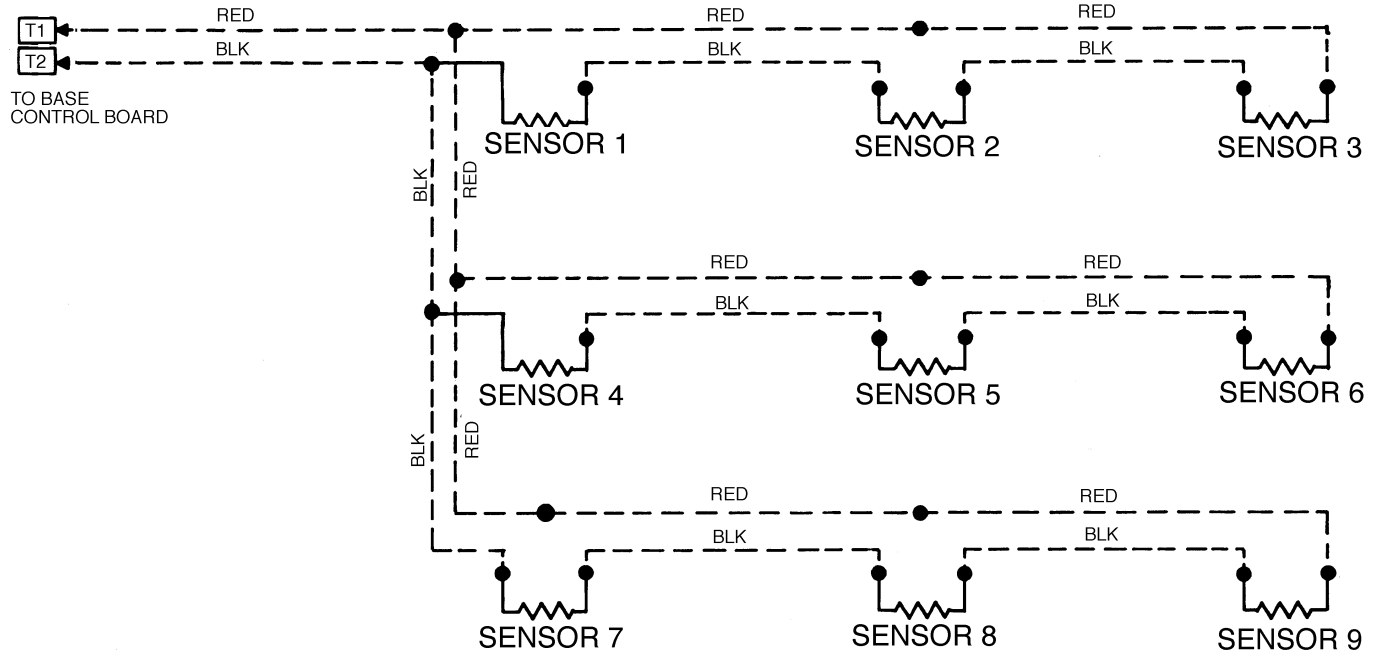


Fig. 42 — LID-2B Wiring



SPACE TEMPERATURE AVERAGING — 4 SENSOR APPLICATION



SPACE TEMPERATURE AVERAGING — 9 SENSOR APPLICATION

Fig. 43 — Space Temperature Averaging Wiring

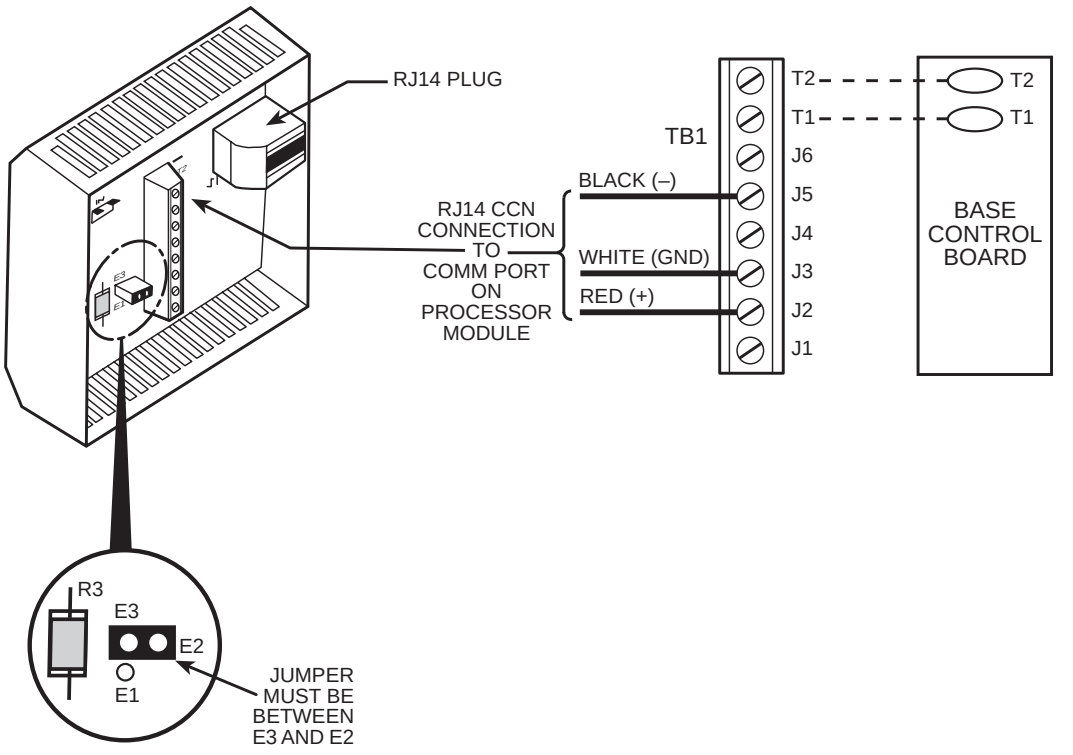


Fig. 44 — Space Temperature Sensor (T-55) Wiring

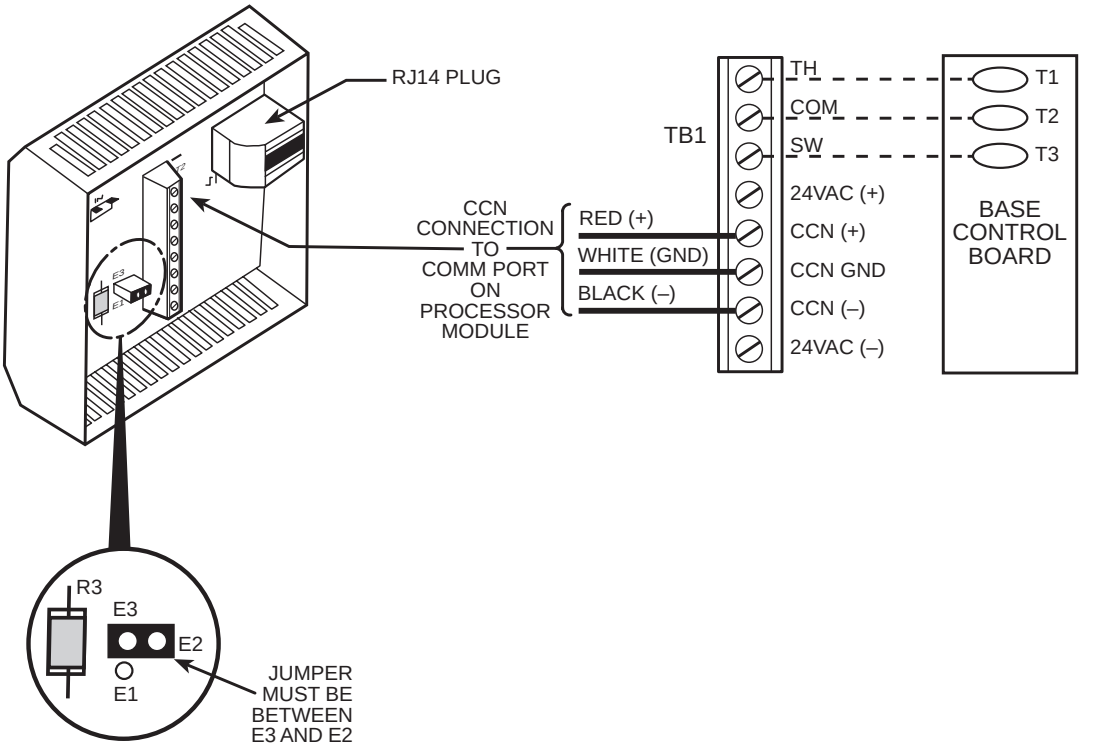


Fig. 45 — Space Temperature Sensor (T-56) Wiring

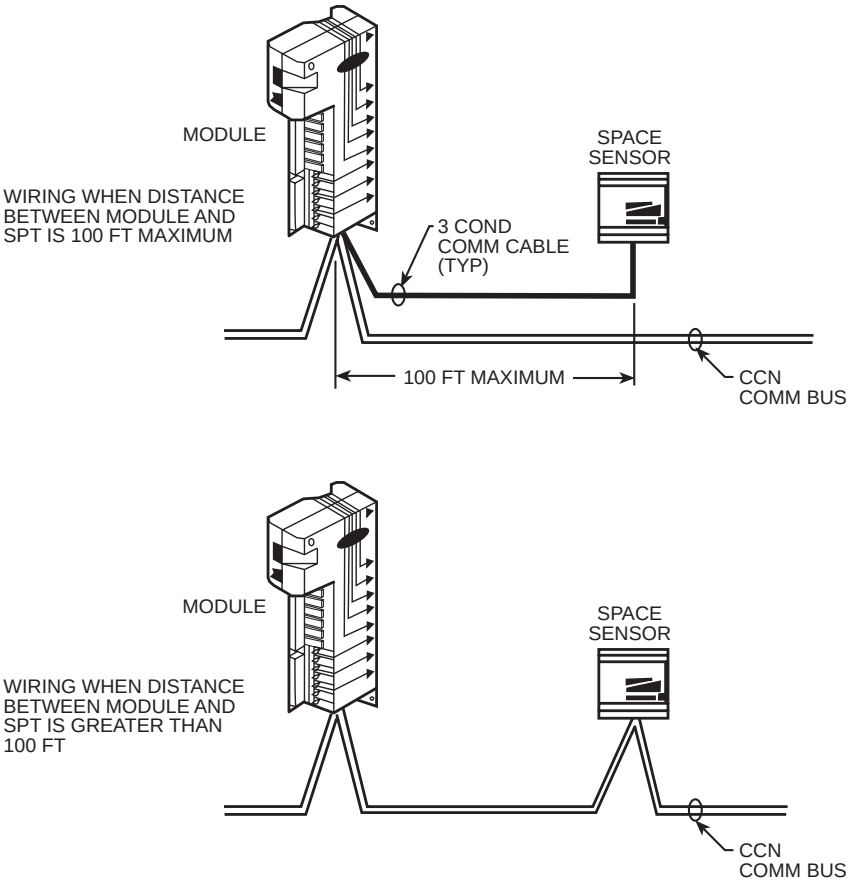
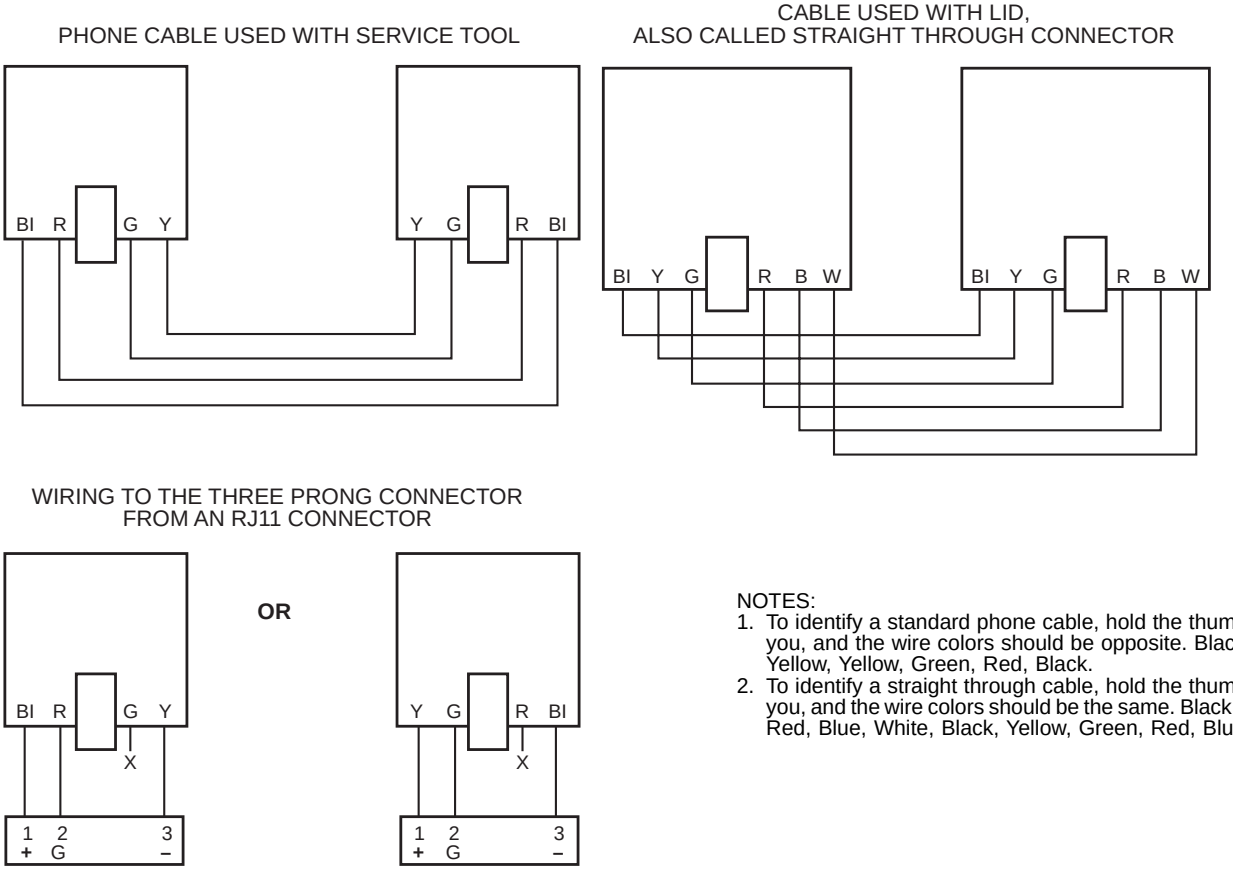
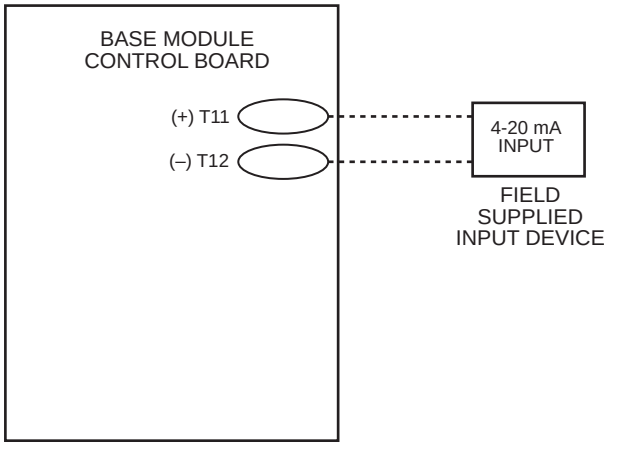


Fig. 46 — Connecting the T-56 Sensor to the CCN Communications Bus



NOTES:
1. To identify a standard phone cable, hold the thumb tabs towards you, and the wire colors should be opposite. Black, Red, Green, Yellow, Yellow, Green, Red, Black.
2. To identify a straight through cable, hold the thumb tabs towards you, and the wire colors should be the same. Black, Yellow, Green, Red, Blue, White, Black, Yellow, Green, Red, Blue White.

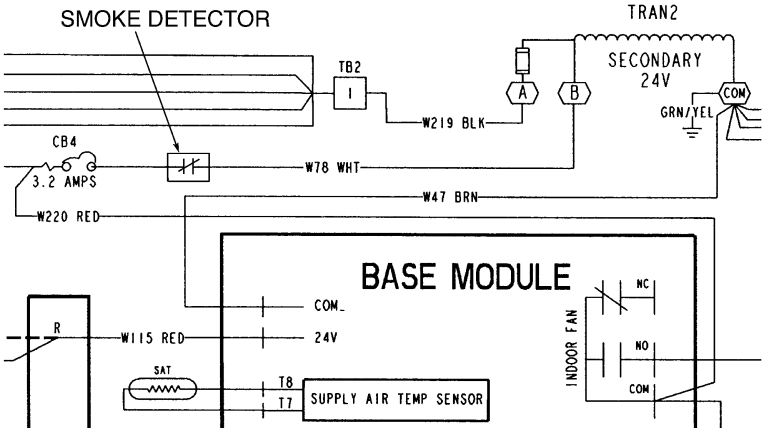
Fig. 47 — Service Tool Wiring



mA INPUT	DEGREES F (C) RESET
4	0.00 (0.00)
5	1.25 (0.70)
6	2.50 (1.40)
7	3.75 (2.10)
8	5.00 (2.80)
9	6.25 (3.50)
10	7.50 (4.20)
11	8.75 (4.90)
12	10.00 (5.60)
13	11.25 (6.30)
14	12.50 (7.00)
15	13.75 (7.70)
16	15.00 (8.40)
17	16.25 (9.10)
18	17.50 (9.80)
19	18.75 (10.50)
20	20.00 (11.20)

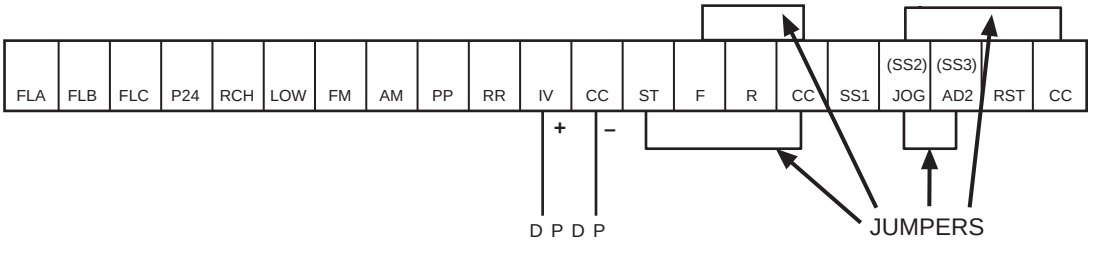
NOTE: The 4 to 20 mA input is a field-supplied non-Carrier EMS (Energy Management System) device.

Fig. 48 — Supply Temperature Reset Wiring



NOTE: On 48E units, indoor fan will continue to run 45 seconds after control power is interrupted due to IGC board time delay.

Fig. 49 — Smoke Detector Wiring



NOTE: Terminal strip is located inside the VFD at the bottom.

Fig. 50 — VFD Control via Field Supplied 4 to 20 mA